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FOREIGN AGRICULTURE REPORT

OFFICE OF
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U.S. DEPARTMENT OF AGRICULTURE
WASHINGTON, D.C.

RECENT CHANGES IN THE CITRUS INDUSTRY OF ISRAEL

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by

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C O N T E N T S

		Page
I.	Summary	1
II.	Geography and Climate of Israel	4
III.	Land Tenure in Israel	6
IV.	Location, Acreage, and Production of Citrus in Israel	7
V.	Soils and Water Resources	13
VI.	Citrus Varieties and Rootstocks	15
VII.	Cultural Practices	17
	Size of the Citrus Groves in Israel	17
	Cultivation	18
	Irrigation	19
	Fertilization	20
	Pruning	20
	Pests and Pest Control	20
	Diseases and Disease Control	22
VIII.	Marketing	23
	Picking and Packing	23
	Export and Domestic Marketing	25
	Marketing Problems of the 1950-51 Season	32
	Some Competitive Factors	37
IX.	Cost of Production and Returns to the Grower	40
X.	The Processing Industry	48
XI.	The Political Situation and the Citrus Industry	57
	The Current Situation	58
	Emigration	58
	Immigration	59
	Rehabilitation	60
XII.	Conclusion	61

FOREWORD

Israel, at the beginning of its national existence, is trying to establish a standard of living far above that of other Middle East countries and above that which its land has ever supported before. This is resulting in a revolution in the type and extent of agriculture, a revolution which will have far-reaching effects on the future of the citrus industry in Israel. This Report is an attempt to evaluate these changes.

The first-hand study upon which this Report is based was made in the fall of 1950 by J. Henry Burke, marketing specialist for this Office, who visited almost all important citrus producing areas in Israel and the more important processing plants. Since much has been written about Israel's citrus industry, the scope of this study is limited primarily to changes which have occurred since the end of World War II in Europe.

This study was conducted under the provisions of the Research and Marketing Act of 1946. The possibilities of broadening and maintaining foreign markets for other agricultural commodities also are being studied by this Office, and the findings are presented in other circulars and reports that may be obtained, free in the United States, from the Office of Foreign Agricultural Relations, United States Department of Agriculture, Washington 25, D.C.

Joseph A. Becker, Chief
International Commodities Branch

A C K N O W L E D G M E N T

Much of the statistical material and economic information on Israel, including prices and wages, was obtained by the Office of the Commercial Attache, American Embassy, Tel Aviv. The assistance of Oliver L. Troxell, Commercial Attache, and Dr. J. H. Levien was a very valuable contribution to this study, and their friendly help is sincerely appreciated.

The helpful assistance by representatives of the industry and Government in Israel is acknowledged, as is that of J.B.S. Braverman, Mendes Sachs, and Dr. Kurt Mendel.

A STUDY OF RECENT CHANGES IN THE CITRUS INDUSTRY OF ISRAEL

by
J. Henry Burke
Marketing Specialist

I. SUMMARY

The new State of Israel includes within its boundaries about 90 percent of the citrus acreage of Palestine. The most important Palestine citrus area outside Israel is that in the vicinity of Gaza, in which district about 10 percent of the citrus acreage of Palestine was located before the Jewish-Arab war.

Before World War II the citrus acreage of Palestine increased rapidly from about 21,500 acres in 1929 to a peak of 74,000 acres in 1939. From 1939 to 1950 total acreage declined because of the abandonment of groves. The greatest change took place during the recent Jewish-Arab war when many Arab properties were left unattended. By 1950 the decline in acreage had stopped and about 31,000 acres remained. Some acreage operated by small growers still may be taken out of citrus production in favor of more profitable crops. However, these changes probably will be only a small percentage of total acreage and may largely be compensated for by groves which are rehabilitated under Israel Government aid.

For the next 8 years the producing area probably will be about at the present acreage of 31,000. Plans are being made for the planting of about 24,700 acres of new groves on land never before irrigated. In the new plantings the Shamouti variety will continue to predominate, so there will be no change in the general character of the citrus industry, according to present plans. If these plans for new plantings are carried out, there will be about 55,700 acres of citrus in Israel in 1958. In the fall of 1950 the seeds for the rootstock were just being collected, and many changes may be made in carrying out these expansion plans. This new acreage should be considered as a possibility, but its realization will depend on many unforseeable factors.

In the next 8 years the present 31,000 acres of bearing groves will provide the commercial production, which may be expected to approximate 6,300,000 boxes of oranges, 1,068,000 boxes of grapefruit, and 250,000 boxes of lemons. There will not be any marked change in production until acreage yet to be planted begins to come into bearing in 1960. Then orange production may increase to about 8,000,000 boxes per year.

Restricted production will limit the importance of the processing industry in the next 10 years unless unusual difficulties are encountered in marketing fresh fruit. At the production levels which will prevail it may be expected that approximately 2,000,000 boxes of oranges, 200,000 boxes of grapefruit, and 75,000 boxes of lemons will be used for processing. The most important product will be 65 Brix orange juice concentrate which will be supplied to the British Ministry of Food for the child health program. About 8,000,000 pounds of this product may be expected to be available for export in a normal year until 1958.

Because of reduced citrus supplies, many citrus processing plants are canning other food items to utilize plant capacity. This is the most significant recent change. Experimentation is being carried on to develop a non-alcohol method of producing pectin and there is some experimentation in progress on frozen concentrates and dehydrated peel. The presence of the Mediterranean fruit fly prevents the production of high quality orange juice.

The domestic consumption of citrus in Israel may be expected to remain at about the 1948-49 level for the next 8 years. It is estimated that the total domestic consumption of both fresh and processed products in the 1948-49 season was about 2,456,555 boxes of Shamouti oranges, 188,966 boxes of Valencia oranges, 212,193 boxes of grapefruit, and 116,032 boxes of lemons. Oranges were rationed at 250 grams per person per week in 1950-51. The quantity of fruit which processors might use for domestic products also was restricted. Domestic consumption will be regulated and restricted as long as production remains at present levels in order that as much fruit as possible be directed toward exports to earn foreign exchange. When supplies are available, it would seem likely that the domestic consumption of citrus in Israel will be considerably above the indicated levels of the 1948-49 season.

Exports have been reduced to a fraction of prewar levels because of the decrease in production. In the next 8 years exports will be restricted to approximately the level of the 1949-50 season when exports were 3,071,749 boxes of Shamoutis, 292,031 boxes of Valencias, 838,749 boxes of grapefruit, and 19,081 boxes of lemons.

England will continue to be the best market and the loss of the Arab middle eastern market will not be too important. Haifa will be the most important export port and Jaffa will be next in importance. There will continue to be a short export season -- from November to May -- but an attempt may be made to extend the export season by planting some early varieties such as Hamlins and Washington navels.

Israel's Shamouti oranges are fairly competitive in European markets, except that the largest size fruits sometimes sell at a lower price per pound than competing fruit. The packed box used by Israel is about 20

pounds heavier than the export boxes of Spain and California. The problem will not be the competing price in the market, but rather the cost of producing the fruit in Israel.

These problems were all illustrated by the marketing situation faced in the 1950-51 season. Because of the high production costs only small quantities of fruit could be sold on advance contract at the price of 28 shillings ($3.92) per box f.o.b., Israel. The return to private control of citrus importation in England created a new situation in which importers would not purchase fruit at the pre-season asking price. Israel therefore started the shipping season with only 350,000 boxes of citrus sold at fixed prices. As the season progressed, the outcome was more favorable than had been anticipated. The prices in the first two weeks were low, following which all shipments were stopped for about two weeks. When shipments were resumed in late January, more favorable prices were received. This was partially due to the smaller quantities of fruit offered, but an advertising program also was helpful.

The whole future of the industry will be affected by the changes brought about by the Jewish-Arab war. The citrus industry of prewar Palestine was based on an ownership pattern in which about half the groves were Jewish-owned and half were Arab property. The groves were tilled largely by Arab labor, and the experienced packing house employees also were Arabs. During or after the war, many Arabs left the country, leaving Arab-owned groves untended and removing most of the grove and packing house labor as well.

During the last few years, there has been a large immigration of Jewish peoples from all parts of the world. These people are unfamiliar with citrus culture and therefore will be a rather ineffective source of labor until they become trained in the new work. Social changes have taken place in the new State of Israel, and as a result, wages of labor have increased greatly compared with wages paid in the citrus industry of prewar Palestine.

The new situation of less skilled and more expensive labor has created the need for labor saving machinery and methods in all phases of the industry. These changes also have created a need for subsidies, and Government policies therefore have become more important to the industry than ever before. As the new citrus industry develops, the large corporate producing unit will be more important than the small grower using a small amount of hired labor. The final place of the citrus industry in the economy of Israel will not be determined for several years until the importance of each of these factors is evaluated by time.

II. GEOGRAPHY AND CLIMATE OF ISRAEL

Geographical Characteristics of Israel

Israel contains an estimated 5,500 square miles on the eastern Mediterranean shore, with Egypt on the south, Transjordan and Syria on the east, and Lebanon on the north. Much of the country is hilly land unsuited to irrigated agriculture or unusable desert such as the Negev area in the south.

There are two important agricultural areas in Israel. First is the plain of Esdraelon which runs inland from Haifa to the Jordan valley with which it connects. This plain, and the Jordan valley, both north and south of Lake Tiberias, are important as a rich agricultural region of extensive non-irrigated agriculture. There is some irrigated agriculture in this area, but not as much as in other areas. This region is surrounded by high hills and the agricultural land ranges from a few hundred feet in elevation to nearly 700 feet below sea level, as near Lake Tiberias. This region in the north has a higher average rainfall than the southern part of the country.

The second important agricultural area is the coastal plain which extends roughly from near Haifa in the north to near Gaza in the south, with the most productive region between Givat Ada, south of Haifa, to Gan Yavne, south of Tel Aviv. This area is a coastal plain 8 to 10 miles wide, most of which is sloping ground on low hills at elevations not exceeding 200 feet in planted areas. Both north and south of Tel Aviv, sand dunes separate the seashore from the agricultural area.

This is the primary region of irrigated agriculture and receives its water supply from the range of hills, 1,200 to 1,500 feet high, which parallel the coastal plain. This relatively low range of hills forms the only watershed for the irrigated agriculture. It is in this irrigated coastal region that the largest citrus plantings are found.

Climate

The area of Israel in which citrus is grown is a rather humid coastal plain which has a marked rainy season. Over 80 percent of the year's rainfall usually falls from November through February. From May through October there is practically no rainfall.

The accompanying statistics on Rehovot may be considered typical. The average annual rainfall in the citrus area is 18.8 inches -- approximately twice that of southern California -- with the area south of Tel Aviv receiving less rainfall than the area north of Tel Aviv.

In the accompanying tables it should be noted that the relative humidity is remarkable for its constancy throughout the year. As might be expected, the daily variation in temperature is not great, and even

Table 1.-Monthly Data on Climate for representative citrus districts in Israel

Month	Lydda			Tel Aviv			Rehovot		
	Temp. in Fahrenheit 1/	Rainfall	Relative humidity	Temp. in Fahrenheit 2/	Rainfall	Relative humidity	Temp. in Fahrenheit 3/	Rainfall	Relative humidity
	Degrees	Inches	Percent	Degrees	Inches	Percent	Degrees	Inches	Percent
January	54.1	5.1	71	55.0	5.6	85	56.3	5.7	68
February	54.1	4.1	64	58.0	4.5	87	57.2	4.4	67
March	57.0	2.8	62	61.0	0.6	82	59.0	0.7	78
April	61.9	0.9	57	66.0	0.6	75	66.0	0.7	68
May	67.3	0.0	61	71.0	0.2	78	71.6	0.1	67
June	74.8	0.0	56	76.0	0.0	80	74.8	0.0	69
July	76.8	0.0	62	80.0	0.02	80	77.7	0.0	69
August	78.1	0.0	61	81.0	0.0	76	78.8	0.0	-
September	76.5	0.0	59	78.0	0.1	74	76.6	0.0	78
October	71.8	2.2	58	73.0	0.8	77	72.0	0.9	72
November	66.9	5.0	57	66.0	3.1	81	64.6	2.5	68
December	58.6	3.7	66	58.0	5.2	77	58.8	3.5	62
Yearly	66.5	23.8	59	69.0	20.8	79	67.8	18.8	

1/ Absolute temperature: Absolute maximum, 106; Absolute minimum, 36.

2/ Absolute temperature: Absolute maximum, 115; Absolute minimum, 37.

3/ Absolute temperature: Absolute maximum, 103; Absolute minimum, 39.

Source: From Foreign Agriculture Report No. 14, September 1946.

late in November it is possible to walk along the seashore of Israel at night without need of a coat. The rather high, even nighttime temperatures are indicated in the development of citrus fruit. In November, when the Shamouti orange is mature enough for export insofar as sugar and acid content are concerned, the average fruit is still green or only breaking in color.

The climate of the citrus area of Israel is considerably milder than that of southern California. Cherimoya, mangoes, and even bananas may be raised in areas in which citrus is grown. That is, of course, a measure of the average relative humidity and of the small variations in temperature from daytime to night.

III. LAND TENURE IN ISRAEL

Land tenure in Israel is more complicated than in most countries, due to the country's unusual history. In the past, as Jewish settlers sought to develop an agricultural industry in Palestine, they purchased property from the former Arab owners. Growers report that in such transactions, misunderstandings and conflicts often arose, since the Arab concept of property is different from the European. Several categories of ownership existed, including fee simple and communal tenure, involving in many cases confusion with respect to title.

In addition to these categories, there are large areas of Government land which are made available for agricultural use through the development authority of the State of Israel. These Government lands are in three categories: first, the properties of the former mandate Government; second, former enemy properties, including property of the German Government and other non-residents, including some property of Arabs; and third, large areas of abandoned Arab properties. These latter lands are in the custody of a bureau set up to handle such affairs, and when agricultural land in this category is utilized, it is leased for a period of 5 years. The Government custodian of abandoned property also is operating some citrus groves which are more favorably situated, or in such condition that it is economically feasible to maintain them as commercial groves.

The abandoned Arab citrus groves will not be replanted to citrus, but will be used for other irrigated agriculture, once the dead trees are removed. The new citrus plantings which are anticipated will be made largely on the Government lands in Israel, as outlined in the above three categories. Such lands will be obtained from the Government on long-term leases.

Another feature of land tenure, a part of the Government policy to develop the agricultural industry of Israel, is the exemption, or near-exemption, of agricultural land from taxation.

IV. LOCATION, ACREAGE, AND PRODUCTION OF CITRUS IN ISRAEL

Citrus Districts in Israel

The citrus districts of Israel will change considerably in the next 10 years if plans for large new plantings are carried out. In general, however, the old citrus area which surrounded Jaffa and Tel Aviv will be eliminated as new urban developments take place.

The most important citrus plantings are in an area 15 miles south of Tel Aviv and in the coastal plain extending about 30 miles north of Tel Aviv. In this district the most important groves in the south are in the vicinity of Rehovot with some extending as far south as Gedera with some groves at Majdal, toward Gaza.

To the east of Tel Aviv there are also important plantings near Petah Tiava, and a large area north of Tel Aviv extends from Raanana approximately to Ha Maapil. Farther north, an important area is in the vicinity of Pardess Hana.

There are also other minor areas, one in the north above Acre, and others at the southern tip of Lake Tiberias in the vicinity of Bitaniya, and still other minor plantings are to be found near Beit Alfa and Beit Ha Shita. These latter areas in and adjacent to the Jordan River valley are operated primarily by Kibbutzes and are the areas, with their desert climate, in which grapefruit predominate as a crop. There, grapefruit mature at least 3 weeks earlier than in the coastal plain.

The new plantings of citrus will be primarily in the coastal plain, in the areas outlined. Of course, exact locations will be determined in the future. The general extent of the industry today is indicated in the accompanying map.

Production

Production of oranges in Palestine has been at a level of about 9 million cases annually during the past 15 years. Estimated production since 1935 is shown in Table 2. It will be noted that in the period from 1935 to 1940, the citrus production of Palestine reached its peak as the new acreage of the expanding industry came into bearing. The highest production was reached in 1938, when an estimated 13,056,000 boxes of oranges and 2,067,000 boxes of grapefruit were produced. If the outbreak of the European war had not curtailed exports, much higher production levels would have been attained in succeeding years.

There are no official statistics on the production of citrus in Israel so the records we have are estimates by government and trade sources and calculations of production based on exports. These sources give a fairly accurate estimate of past production. Since the new State of Israel includes the major portion of the citrus acreage of the former

Table 2.-Israel: Estimated production of citrus, 1935-1950

Year	Oranges	Grapefruit	Lemons
	1,000 boxes 1/	1,000 boxes 2/	1,000 boxes 3/
1935	4,992	844	80
1936	9,191	1,534	80
1937	9,573	1,794	80
1938	13,056	2,067	100
1939	6,448	988	100
1940	7,200	700	100
1941	9,870	550	70
1942	5,000	300	60
1943	8,400	800	60
1944	7,000	692	312
1945	8,000	800	120
1946	9,199	1,238	353
1947	13,000	1,500	500
1948 4/	6,300	1,068	250
1949 4/	5,750	750	100
1950 4/	5,300	600	100

1/ 70-pound boxes.

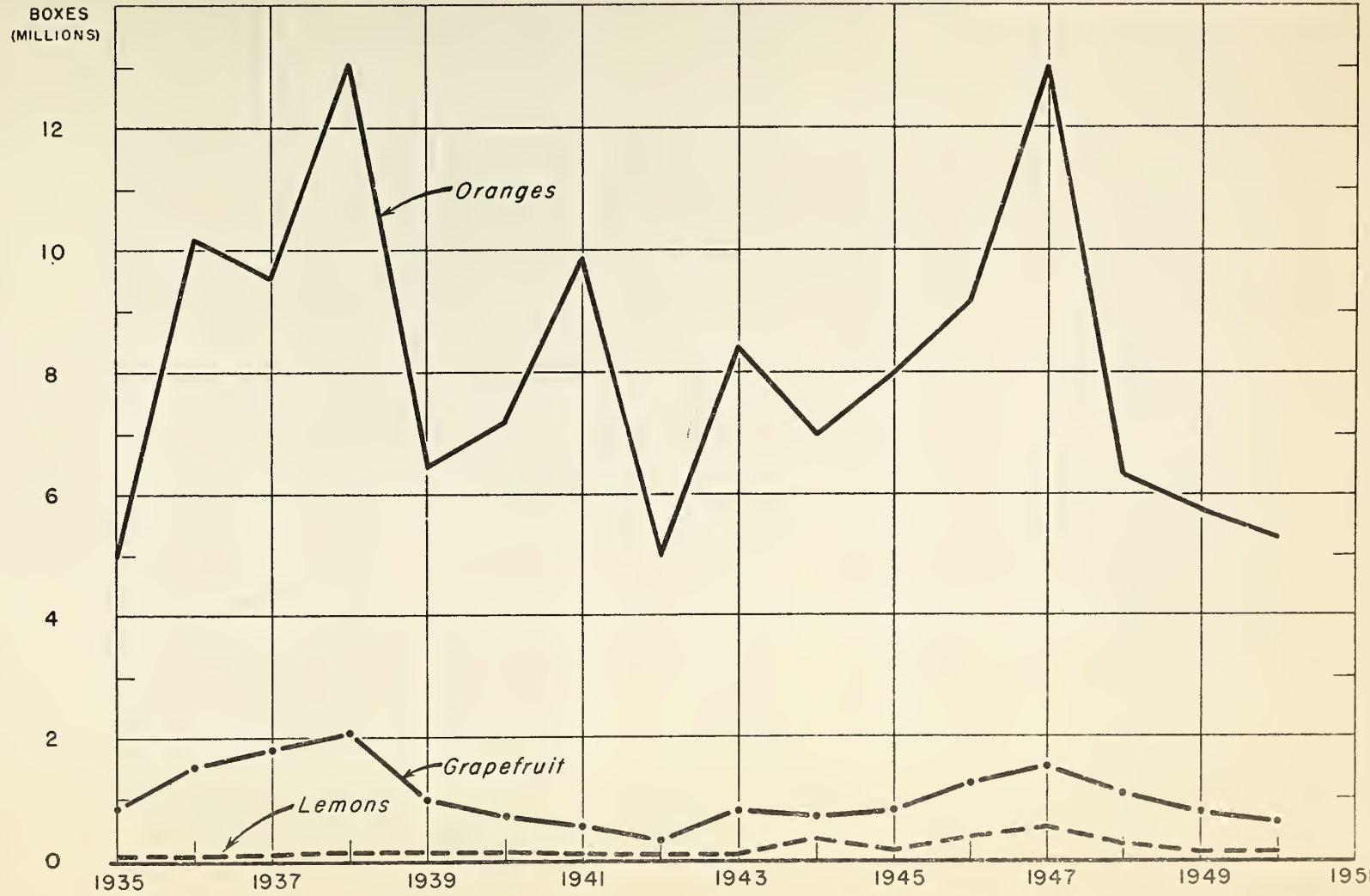
2/ 80-pound boxes.

3/ 76-pound boxes.

4/ Israel production.

Source: Estimates from exports and trade sources.

ESTIMATED TOTAL CITRUS PRODUCTION IN PALESTINE AND ISRAEL, 1935 - 1950



U.S. DEPARTMENT OF AGRICULTURE NEG. 1661 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

State of Palestine, production figures before and after the war are representative of yields on approximately the same areas. The most important citrus area not now a part of Israel is in the region of Gaza, which is now under the control of Egypt.

Citrus production may be expected to remain for the next 5 years at about the level of the 1948 season when 6,300,000 boxes of oranges and 1,068,000 boxes of grapefruit were produced. There will not be any marked change in production until acreage yet to be planted comes into bearing, about 1960. At that time orange production may increase to about 8,000,000 boxes per year, but there are no indications at this time that the levels of the 1938 season will ever be attained again.

Citrus Acreage in Israel

The citrus industry in Palestine started its rapid growth about 1922 and continued to increase until the beginning of World War II in 1939. It would be fair to estimate that about 90 percent of the citrus acreage which was formerly in Palestine is now in the area which is Israel. The lack of opportunity to export during the war stopped all citrus plantings, and the decrease in acreage started at that time.

At the conclusion of the difficulties caused by the war, groves again were being properly cared for and brought into commercial production in 1947-48. However, this change in the industry was rather short-lived due to the Jewish-Arab war, during which time the activities of the citrus industry were brought to a standstill and large areas were not irrigated for 2 years. This neglect, following the unprofitable World War II years, has caused large areas to be abandoned.

The story of these changes is told in the accompanying tables and charts. The first series in Table 3 illustrates the growth of the citrus industry of Palestine from 1922 to 1939 and the decline in acreage which started during World War II. This series from the statistical handbook of Jewish Palestine is not complete to 1945 since it omits data for 1937, 1938, 1940, 1942, 1943, and 1944.

In the table, area is divided according to ownership as was the custom in statistics on Palestine. Until 1934 Jewish planting exceeded that of the Arab growers and in 1934 the total Jewish acreage was about 10,000 acres greater than the Arab-owned acreage. After 1934 the rate of Jewish planting declined, but the expansion of Arab groves continued through 1936. By 1939 the holdings of the two groups were more nearly equal and the total indicated Jewish acreage of 38,424 was only 2,842 acres greater than the total Arab-owned acreage of 35,582 acres. By 1945 this relationship had changed still further and the Arab-owned 32,123 acres exceeded the 29,652 Jewish-owned acreage by 2,471 acres.

The planted citrus area is shown in greater detail in Table 4, which continues to divide the area by ownership and also indicates the estimated acreage in other than commercial condition. These data are from a different source than the preceding table and since they are estimates they do not agree exactly.

The latest statistics available in 1947 indicate that at that time there were in Israel 231,833 dunums (57,286 acres) of commercial citrus groves, and an additional area of approximately 23,000 dunums (5,683 acres) which was being top-worked, neglected, or abandoned, making the total citrus area at that time 255,089 dunums (63,032 acres).

A survey of the citrus acreage of Israel has recently been made by the Israel Department of Agriculture. The tabulation of this data is not complete at the time of writing, but should be available some time in 1951. Enough data have been accumulated, however, to indicate that the total citrus area in which groves are in reasonable commercial condition is approximately 136,000 dunums (33,606 acres), less than one-half the acreage planted to citrus before World War II. Of this 136,000 dunums (33,606 acres), only 100,000 dunums (24,710 acres) are estimated to be in good condition, and the remaining 36,000 dunums (8,896 acres) consist of marginal properties -- groves in poor condition, or abandoned groves on which attempts are being made to bring them back into production. Some of these groves will ultimately have to be removed, and therefore the effective acreage today may be considered to be somewhat less than 136,000 dunums (33,606 acres) 1/.

Plans are under way to plant 100,000 dunums (24,710 acres) of new groves. In the fall of 1950 the seeds for the nursery stock for this new planting were just being collected. If the planned schedule is followed, the new nursery trees for this area will not be ready to plant before the spring of 1954, and perceptible increases in production from this acreage will not be experienced before 1958 to 1960. It would be a fair estimate that out of the present citrus acreage, approximately 125,000 dunums (30,888 acres) may be considered to be primarily commercial, and if we assume that none of these will go out of production in the near future, the planned commercial citrus acreage by 1958 will probably be about 225,000 dunums (55,598 acres) or approximately the same as the season 1933-34.

This new acreage will be different from the old pattern in Palestine, since the groves will be planted in a more modern fashion, with at least one-third fewer trees to the acre. It may be expected that the average yield per acre from the new plantings will not be so great as in the densely planted, hand-cared-for groves of the old Palestine citrus industry.

1/ Israel Department of Agriculture.

CITRUS ACREAGE IN PALESTINE AND ISRAEL, 1922-1950

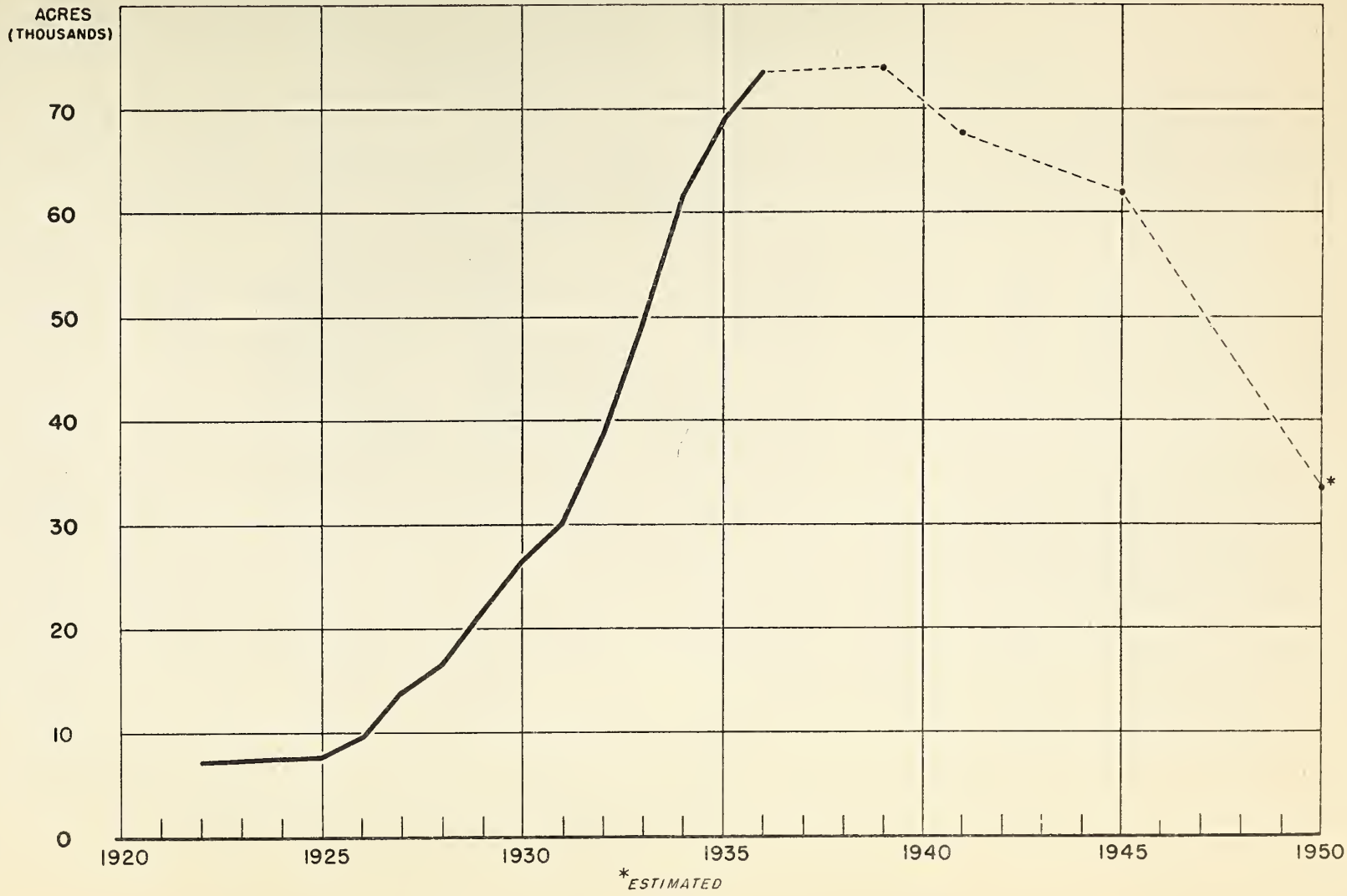


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Table 3.-Palestine: Trend in citrus acreage, 1922-1945

Year	Jewish Ownership				Arab Ownership				Total			
	Planted		At end of year		Planted		At end of year		Planted		At end of year	
	dunums	acres	dunums	acres	dunums	acres	dunums	acres	dunums	acres	dunums	acres
1922..	-		10,000	2,471	-		19,000	4,695	-		29,000	7,166
1923..	500	124	10,500	2,594	-		19,000	4,695	500	124	29,500	7,289
1924..	500	124	11,000	2,718	-		19,000	4,695	500	124	30,000	7,413
1925..	500	124	11,500	2,842	-		19,000	4,695	500	124	30,500	7,537
1926..	5,500	1,359	17,000	4,201	2,500	618	21,500	5,312	8,000	1,977	38,500	9,513
1927..	7,000	1,730	24,000	5,931	10,500	2,594	32,000	7,907	17,500	4,324	56,000	13,838
1928..	7,000	1,730	31,000	7,660	4,000	988	36,000	8,896	11,000	2,718	67,000	16,556
1929..	15,000	3,706	46,000	11,367	5,000	1,236	41,000	10,131	20,000	4,942	87,000	21,498
1930..	14,000	3,459	60,000	14,826	5,500	1,359	46,500	11,490	19,500	4,818	106,500	26,316
1931..	10,000	2,471	70,000	17,297	5,000	1,236	51,500	12,726	15,000	3,707	121,500	30,023
1932..	20,000	4,942	90,000	22,239	15,000	3,706	66,500	16,432	35,000	8,648	156,500	38,671
1933..	30,000	7,413	120,000	29,652	13,500	3,336	80,000	19,768	43,500	10,749	200,000	49,420
1934..	25,000	6,178	145,000	35,830	25,000	6,178	105,000	25,945	50,000	12,355	250,000	61,775
1935..	8,000	1,977	153,000	37,806	20,000	4,942	125,000	30,888	28,000	6,919	278,000	68,694
1936..	2,000	494	155,000	38,301	18,000	4,448	143,000	35,335	20,000	4,942	298,000	73,636
1939..	500	124	155,500	38,424	1,000	247	144,000	35,582	1,500	371	299,500	74,006
1941..	-		135,000	33,358	-		139,000	34,347	-		274,000	67,705
1945..	-		120,000	29,652	-		130,000	32,123	-		250,000	61,775

Source: From Statistical Handbook of Jewish Palestine, 1947, pp. 179-183.

Table 4.- Israel: Area planted with citrus, 1945 and 1947

Variety and citrus bearing area	1945					
	Arab and other non-Jewish-owned		Jewish-owned		Total	
	dunums	acres	dunums	acres	dunums	acres
Shamouti oranges	103,148	25,488	84,217	20,810	187,365	46,298
Valencia oranges	11,179	2,762	12,103	2,991	23,282	5,753
Grapefruit	2,225	550	11,994	2,964	14,219	3,513
Lemons	4,181	1,033	3,829	946	8,010	1,979
Other citrus	3,502	865	2,430	600	5,932	1,466
Total	124,235	30,698	114,573	28,311	238,808	59,009
Top-worked areas	3,129	773	1,569	388	4,698	1,161
Heavily pruned areas	987	244	2,276	562	3,263	807
Replanted since 1939	1,562	386	320	79	1,882	465
Neglected areas	2,699	667	2,533	626	5,232	1,293
Abandoned areas	2,381	589	7,713	1,906	10,094	2,494
Total citrus area	134,993	33,357	128,984	31,872	263,977	65,229
	1947					
	Arab and other non-Jewish-owned		Jewish-owned		Total	
	dunums	acres	dunums	acres	dunums	acres
Shamouti oranges	101,428	25,063	79,243	19,581	180,671	44,644
Valencia oranges	11,651	2,879	12,075	2,984	23,726	5,863
Grapefruit	2,424	599	11,208	2,769	13,632	3,368
Lemons	3,812	942	3,438	849	7,250	1,791
Other citrus	3,690	912	2,864	708	6,554	1,620
Total	123,005	30,395	108,828	26,891	231,833	57,286
Top-worked areas	3,026	748	927	229	3,953	976
Neglected areas	5,926	1,464	1,799	445	7,725	1,909
Abandoned areas	2,610	645	8,968	2,216	11,578	2,861
Total citrus area	134,567	33,252	120,522	29,781	255,089	63,032

NOTE: 4 dunums = 1 acre (approx.).

Source: Official sources from the office of the Commercial Attache, American Embassy, Tel Aviv.

V. SOILS AND WATER RESOURCES

Soils

The soils of Israel suitable to citrus are in the coastal zone bordering the seacoast north and south of Tel Aviv mostly within 10 miles of the sea. The soil types are extremely variable but are usually a light sandy loam. It is characteristic that there are considerable variations in soil within short distances. In many cases, as in alluvial areas, sandy soil on top may lie over a considerably heavier soil underneath.

As generally observed in the citrus orchards, most of the areas now in citrus have a sandy loam which is too light to crack when drying, and many of the orchards have an extremely light soil. One can walk through the orchard very easily a day after irrigation.

In the small citrus area in the Jordan valley near Lake Tiberias, soils are considerably heavier and are a clay-loam type. Provided water is available for irrigation, many very sandy soils would probably be suitable for citrus if fertilization practices were modified to suit soil conditions in order that excessive leaching would be avoided.

Water Resources

The potential development of citrus in Israel is dependent on the availability of water for irrigation. Probably 75 percent of the irrigated lands of Palestine are now in the State of Israel. In 1946 Robert R. Nathan 2/ reported that approximately 400,000 dunums (98,840 acres) were being irrigated in Palestine, at least 300,000 dunums (74,130 acres) of which are now in the territory comprising the State of Israel. The 400,000 dunums irrigated used 250 to 300 million cubic meters (202,677 to 243,213 acre feet) of water per year.

In the same report it is stated that the Water Research Bureau of the Jewish agency has estimated that in Palestine there were 6,728,879 acre feet of water available from rainfall, plus an additional 2,269,983 acre feet of water from the flow of the Yarkon River. This supply of water was estimated to be sufficient to irrigate 4 million dunums (988,400 acres) in Palestine, or 3 million dunums (741,300 acres) in Israel. On the basis of this estimate the irrigated area could be increased 10 times as compared with the 1946 irrigated area.

Water development projects being carried out by the Government have disclosed that the limestone rock of the hills offers an untapped source of water-bearing strata. While this will require deeper wells, it is a new and valuable source. Under this project it is planned to have a series of wells in the foothills which will draw water from this source

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2/ "Palestine Problem and Promise," by Robert R. Nathan, page 401.

and bring new areas under irrigation. This lime rock is said to hold important quantities of good water, and to be highly absorbent of rainfall, reducing runoff to an estimated 5 percent. Explorations for water are continuing in all parts of the country.

From the writer's observations, it is apparent that there are considerable undeveloped water resources at this time. However, in evaluating their importance to the citrus industry, the changing situation in Israel must be taken into account. The resettlement of immigrants, with new community developments in all parts of the country, is a vast project which will not be complete for many years.

The new immigrants coming into Israel at a rate of at least 20,000 per month will make large demands on the water resources in the future. These immigrants, after they leave the introduction camps, are being settled largely on newly irrigated land. The usual settlement takes the form of a group of prefabricated houses, each with a large garden irrigated by sprinklers. Those immigrants who go into industrial work are being housed in urban apartments. The important factor is that the new immigrants will use far more water than did the displaced Arabs. The immigrants displacing the Arabs may well use 5 to 10 times as much water per person. It will require years to settle immigrants already in the country without considering the thousands who may yet come. The full impact of the immigration on the water supply that will be available for citrus culture will not be felt in full until about 1960.

Another factor of importance is the demand which the new population is making for irrigation water to use in producing vegetable crops.

If present plans are carried out, the abandoned citrus groves will be cleared and the land used for non-citrus irrigated crops. The new plantings of citrus will be made on new sites never before irrigated. Israel has wells for irrigation, but no mountain range to supply a watershed such as is found in southern California. While the average rainfall is about twice that of California, about 20 inches a year, and there are undeveloped water resources, the new agricultural development plus the water demands of the new immigrants will test the water resources in the next 10 years. This test has already started and growers report that in areas where the water level is now 65.6 feet, it was 50.0 to 53.2 feet 10 years ago.

Today over one-half of the population of Israel is located in urban centers, and if shortages occur, the urban population usually receives a higher priority than agriculture.

Plans have been made to use treated sewage to supplement the supply of water for irrigated agriculture, but it remains to be seen how effective such plans may be.

It is certain that the water supplies are limited and will be tested in the near future, and that as a result water for irrigated agriculture will be more expensive than in the past.

The present irrigated area of Israel is estimated at nearly 500,000 dunums (123,550 acres) and in the next 10 years this may be increased to over 1,000,000 dunums (247,100 acres), as new projects are completed.

VI. CITRUS VARIETIES AND ROOTSTOCKS

Citrus Varieties

The most important and most interesting variety grown in Israel is the Shamouti orange. This is sometimes called the Jaffa, after the old Arabic port near the town of Tel Aviv from which export oranges are shipped.

It is estimated that citrus has been raised in Israel for as many as 2,000 years, and the local variety which is comparable to the comuna of Spain, is the beledy (belady, beladi) 3/ which is generally a round, seeded, non-blood orange. This is a group of common oranges rather than a single variety, and the production from such trees is used either for processing or for local consumption. It is not an early orange, but tends to ripen in the mid-season about the same time as the Shamouti.

The Shamouti variety originated in Israel, and is a mutation from the beledy. It is not a very stable variety, and old Shamouti trees may mutate back to beledy when they reach the age of 25 or 30 years. Such mutations were observed in commercial orchards. The Shamouti is very sensitive to the rootstock upon which it is grown and the character of the fruit accordingly will vary widely. The characteristic oval Shamouti, with the flat or depressed area in the stem, is the common shape of this variety when raised on sweet lime stock. When the fruit is raised on sour orange, the trees not only mature 3 to 5 years later, but also produce a fruit which is rounder and thinner-skinned, and sufficiently different to be considered another variety if one did not know the source of the scion stock.

The late Valencia is the second most important export variety of orange, but is a minor variety as compared with the Shamouti.

The Marsh seedless white grapefruit is the most important variety of grapefruit and is grown entirely on sour or bitter orange rootstock.

Lemons are grown to a minor extent, and the varieties grown are both American and Italian.

3/ Beledy is an Arabic word meaning "common;" this fruit, therefore, is what we might call a seedling.

The sweet lime, which bears a small fruit about the size of a clementine, is seeded and almost acidless, and has a lemon-like characteristic in the blossom end, is the source of most of the rootstock on which citrus is grown in light soils. This is a distinct variety and is not the same as the sweet lemon. It has been introduced into the experimental gardens in Texas and in California, as has another lime rootstock, the beledy lime.

In the future, the commercial citrus industry of Israel will be based upon the Shamouti orange as in the past, with some production of Valencias to produce late oranges. The growth of Valencia plantings is, however, hampered by the destruction of its fruit by the Mediterranean fruit fly. In the future it may be expected that an early variety will be chosen to extend the fruit season, and experimentation is being carried out with such types as Washington navels and the Hamlin.

The clementine, an orange-tangerine hybrid, is also grown commercially in Israel for domestic consumption. Under Israel's climatic conditions this fruit is exceedingly early, and fruit of excellent edible quality may be harvested about October 15.

Table 5.-Israel: Citrus varieties and area at the end of 1945

Variety	Jewish Groves		Arab Groves		Total Area	
	dunums	acres	dunums	acres	dunums	acres
Shamouti orange	86,203	21,301	104,988	25,942	191,191	47,243
Valencia orange	12,638	3,123	11,578	2,861	24,216	5,984
Grapefruit	11,656	2,880	2,250	556	13,906	3,436
Lemon	3,855	953	4,142	1,023	7,997	1,976
Various, unspecified	5,648	1,396	7,042	1,740	12,690	3,136

Source: From Statistical Handbook of Jewish Palestine, 1947, pp. 179-183.

Rootstocks

There are two important rootstocks utilized commercially in Israel -- the sour orange and the sweet lime. Sweet lime rootstock is utilized on light soils, and when the Shamouti is budded to it, commercial production is attained in 5 years. As is usually the case, the early high production thus obtained shortens the life of the tree, and the commercial age of a Shamouti orchard on sweet lime stock will probably not exceed 25 or 30 years on the average. However, very high production will be obtained.

Figure 1.--A typical example of close-planted groves in Israel.

Figure 2.--A newly planted grove, a rare sight in Israel today.

Figure 3.--A grove operated by non-tillage.

Figure 4.--Sections of the sweet lime used as a root stock for sweet oranges.

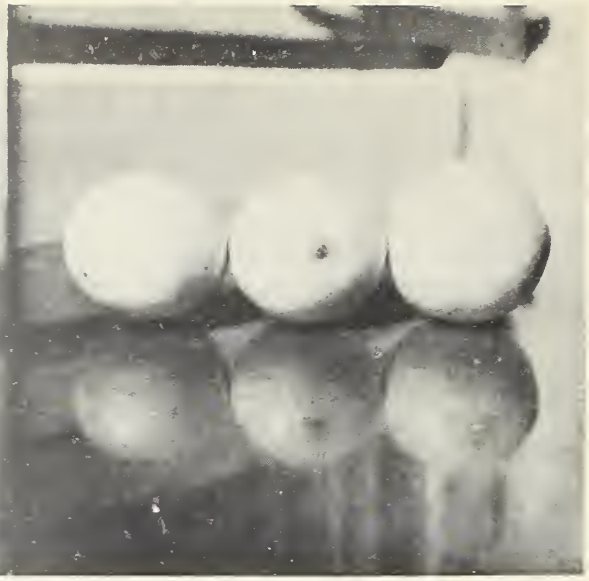

Figure 5.--Sweet lime fruits.

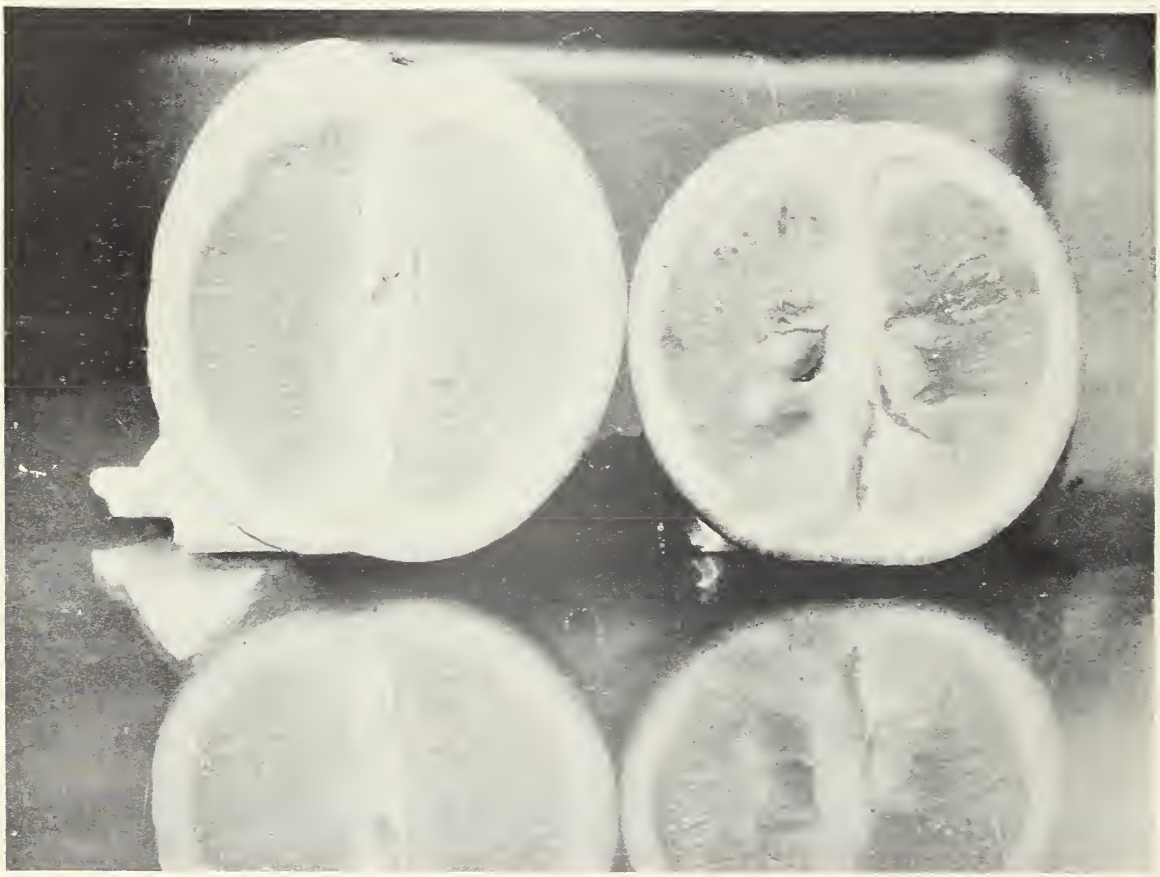

Figure 6.--Sections of the Beledy orange on the right and the Shamouti on the left.

Commercial groves planted 60 trees to the dunum (243 trees to the acre) have produced as much as 200-90-pound packed boxes per dunum (809 packed boxes per acre). It may be anticipated that new plantings on light soils will continue to utilize this rootstock.

The second most important rootstock is the sour orange, which in Israel is synonymous with the Seville orange. This rootstock is utilized for groves planted on heavy soils, and on all grapefruit, in order to make the trees more resistant to gummosis. The trees grown on this stock are much larger than the Shamouti trees grown on sweet lime, and the difference can be seen in the orchard. The trees come into bearing 2 or 3 years later than the Shamouti on sweet lime, and the fruit is apt to be thinner-skinned and somewhat smaller than when sweet lime root is used. Inarching is practiced commercially in Israel, and groves started on sweet lime root to obtain early production, may subsequently be inarched to sour orange in order to strengthen the tree and prolong the life of the orchard.

These two rootstocks will continue to be used in future plantings, depending on soil types, and may be used commercially as supplements to one another, with the sweet lime getting early production and the inarched sour orange assuring more permanent growth and resistance to xyloporosis.

Recently, experiments have been started using sweet orange rootstocks to eliminate a potential threat which "quick decline" has made to all areas in which citrus is raised on sour or bitter orange rootstock.

VII. CULTURAL PRACTICES

Size of the Citrus Groves in Israel

In the past, the most important unit in the citrus industry has been the small, family-operated grove. Over 40 percent of the commercial citrus units were less than 10 acres, and only a very small percentage were over 20 acres in size. This historical pattern of size of groves is indicated in the accompanying tabulation of the sizes of groves in Israel in 1948, but this should be considered as the historical pattern rather than the present trend. In the past, groves were primarily hand-tilled and therefore adaptable to small units of operation. Even the middle-sized grove of 10 acres found Arab labor readily available for cultivation.

Economic changes brought about by the Jewish-Arab war have altered this situation, and the emigration of Arab labor and the subsequent increase in the cost of domestic labor available for citrus cultivation has made labor for citrus cultural purposes both expensive and inefficient. In the next 5 years the Government is planning a planting of 100,000 dunums (24,710 acres) of new orchards. These orchards will be cultivated by mechanical means and will be in large units to make possible adequate management and economic employment of cultural labor under the new conditions.

Therefore, in the future the middle-size grove which employed small amounts of labor will virtually be eliminated, and the industry will be composed largely of two groups of groves: first, the small operation of 5 acres or less which will be tilled primarily by the owner and his family, and secondly, the very large operation, most of which will be groves of one hundred acres or more.

Table 6.-Israel: Citrus groves, percent of numbers and area by size groups, 1948

Size of grove		Percentage of total number of groves	Percentage of total citrus area
Dunums	Acres	Percent	Percent
1-- 10	.2471 - 2.471	37.5	9.0
10-- 20	2.471 - 4.942	28.3	15.8
20-- 30	4.942 - 7.413	12.7	12.3
30-- 40	7.413 - 9.884	6.2	8.7
40-- 50	9.884 - 12.355	4.0	7.3
50-- 60	12.355 - 14.826	2.7	5.9
60-- 70	14.826 - 17.297	1.9	4.9
70-- 80	17.297 - 19.768	1.3	4.0
80-- 90	19.768 - 22.239	1.0	3.6
90--100	22.239 - 24.710	1.0	4.0
100--120	24.710 - 29.652	1.0	4.6
120--150	29.652 - 37.065	0.9	5.1
150--200	37.065 - 49.420	0.8	5.8
200 and over	49.420 and over	0.7	9.0
TOTAL		100.0	100.0

Source: Anglo-Palestine Yearbook, Vol. 2nd., pp. 147-153, 1947-48.

Cultivation

The practices of cultivating citrus in Israel are changing very rapidly, due to the labor situation. In the past, the industry has been built on closely planted groves which were hand-cultivated in much the same fashion as the Spanish and Italian groves. Arabs formed the source of labor for this work. Today there are few hand-cultivated groves in Israel, and they are still small family operations. The closely planted grove is usually operated by a non-tillage system in which weeds are killed by oil sprays twice a year, or hoed or mowed twice a year. In the larger groves which employ hired labor, non-tillage is also being used, and in some small areas in which tillage is still employed, the groves are being thinned by the removal of every second row of trees in order to facilitate mechanical cultivation.

From the present tendency, it would seem that in the future groves will be operated by one of two systems -- either non-tillage in closely planted groves or mechanical cultivation by disc harrows in the thinned and newly planted areas.

Irrigation

Like cultivation, the citrus irrigation practice in Israel has undergone a marked change due to new conditions. Much of the former commercial citrus area in Palestine was irrigated by a flood-basin method with the grove being prepared in such a manner that the area immediately around the tree trunk was left dry. In such irrigating practice the orchard was prepared entirely by hand, and the water was pumped by small gasoline or diesel engines and distributed in the orchard in small open concrete ditches. This type of irrigation was followed quite generally in the Arab-owned orchards, and also was used to a considerable extent in the small Jewish groves.

While this type of irrigation was the general practice, there were also small areas irrigated by furrows, and during the last 15 years, sprinklers have come into increasing use.

With the cost of labor greatly increased, the old method of basin irrigation is now impractical and is being replaced by sprinklers. A considerable amount of the 5 million dollars allocated to the citrus industry from the Import-Export Bank loan of 1950 was expended for irrigation pipe, and over a million feet was purchased in the United States 4/. The citrus experiment station estimates that under the old basin system of irrigation, 20 man-days per acre per year were required, compared with 8 man-days per acre per year with sprinklers.

The sprinkling systems employed are primarily mobile; the perforated pipe similar to that used in Florida is in most general use. In addition to the labor saving features of sprinklers, this method of irrigation also applies the water more efficiently, considering the changes in soil texture which occur over short distances. It is also possible to accomplish a more even irrigation of groves by this method.

It may be expected that in the new citrus areas yet to be planted, sprinkler irrigation will be extensively used. Moreover, in the new irrigation projects where settlements of immigrants are being created, sprinklers are the primary means of irrigating vegetables, as well as fruit groves.

4/ In 1951 another loan was made by the Import-Export Bank and the citrus industry is reported to have received 3½ million dollars, making a total of 8½ million dollars.

Fertilization

In prewar years it was the usual practice to supply part of the citrus fertilization requirements from organic manures and part from simple nitrates. In the old industry, the manures were supplied primarily from Arab sources; much of it was collected by Arab boys in the inland grazing areas and transported in bags to the coastal citrus plain, often on camels. This source of fertilizer is now cut off due to the closing of the border between Israel and the Arab countries. There is a very small amount of manures available from local sources due to the relatively small animal population. The primary source of fertilizer for citrus in recent years has been nitrates imported each year and disbursed to the citrus industry by the Control Board 5/. It seems likely that this type of fertilization practice will continue, and this may have an effect upon the quality of the fruit produced, as was experienced in Spain in the 1930's, when excessive amounts of simple nitrates were used in the groves.

In 1950 sulfate of ammonia sold for 30 Israel pounds per metric ton ($76 per short ton) and a 4 percent reduction was allowed for large cooperative associations. Nitrate of lime sold for 29 Israel pounds per metric ton ($74 per short ton). During the 1951 season it is thought that chemical fertilizer prices may be somewhat less than last year.

Pruning

Pruning has not been practiced extensively in Palestine and Israel, probably due partly to the fact that the Shamouti raised on sweet lime stock is a dwarf tree. Generally, pruning was used only to train the young trees and to remove dead wood.

Researches 6/ conducted as part of the program of rehabilitating abandoned groves has indicated that the die-back of trees depletes the starch content of the living tissue. Therefore, if trees are pruned only to the extent of removing the dead wood and cutting back into still living tissue, a vigorous growth may not ensue. Experiments have indicated that the tree must be pruned back severely enough into the living tissue to a point where the starch content of the tissue is normal, and only under such conditions will vigorous new growth take place.

Pests and Pest Control

The pest control problems of Israel are rather simple compared with other commercial citrus areas, and only about one-fourth of the citrus area is sprayed each year for commercial pest control. Many

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5/ An allocation of 40 pounds per acre of chili nitrate was made in November 1950.

6/ Dr. Kurt Mendel, Agricultural Research Station, Rehovot.

groves are sprayed once every 3 years or, at most, every other year.

The most important pest is the Mediterranean fruit fly, which is particularly damaging in October and November before the first rains, and again in the spring after the rainy season. The rains do not act as a control, but the temperatures during such times are unfavorable to larva development, and thus reduce the fly population. On the average, the loss from the fruit fly is within bearable commercial percentages. However, in some badly infested groves, losses as high as 75 percent of the total crops have been found 7/. At present, due to the shortage and high cost of labor, the infected fruit is not collected and buried, as is the usual control practice. The degree to which a grove is infested with the fruit fly may in part depend upon irrigation practices. It has been observed that groves which are irrigated improperly so that the fruit tends to mature earlier, due to lack of moisture in the soil, tend to have a heavier infestation than groves properly irrigated. The fly will attack fruit which first begins to break in color and will also attack the fruit which matures first, regardless of whether a break in color is apparent. The citrus experiment station in Israel is conducting intensive experiments on the Mediterranean fruit fly and problems of control. Generally speaking, orchards which follow the best commercial practices have the smallest amount of damage from this pest.

The second most important pest is what is known locally as black scale, but which is the Florida red scale. In orchards which are improperly cared for, this is the pest which is most apparent, and it is for the control of this scale that most spraying operations are performed.

In the past, purple scale and the California red scale have been important pests in Israel, and growers say that at one time it was feared they might destroy the industry. These heavy infestations generally occurred in young groves, and as trees matured the heavy scale population decreased. They are no longer important commercial pests. Some growers express the opinion that a biological control might be partially responsible, but Israel scientists believe that the climate is unfavorable to these scale pests.

The control of scales utilizes oil sprays. Because groves often are closely planted, the spray rig is parked outside the grove, and the spraying is done from hoses which may be carried 600 or 700 feet into the grove. Under such an operation, towers can not be used, and since the Shamouti tree on sweet lime root produces a rather dwarf plant, this is not such an important problem. In some of the groves planted with spacing between trees of 20 or 22 feet, or which have been thinned, towers may be employed. Some equipment for this purpose has been purchased under funds made available by the Import-Export Bank loan.

7/ In 1951 milk weather in southern Israel resulted in heavy damage by the fruit fly. Groves near Raanana were not damaged.

Generally, well-kept groves are commercially free of scale problems, which is remarkable considering the limited pest control measures used. It was interesting to note that in many abandoned groves where there was still some leaf population, there was no scale, even though no pest control measures had been taken for many years.

Diseases and Disease Control

As observed in the field, the Israel citrus industry is remarkably free from disease. There are, however, several problems of commercial importance. Psorosis is to be found on Valencia and Marsh seedless grapefruit trees. This disease has not appeared on the Shamouti variety. In the past, there has been considerable top-working from one variety to another and some growers believe that there has been an ample opportunity for the Shamouti to become infected with this virus. However, since none has appeared, the possibility of the Shamouti's resistance to this disease should be considered.

Xyloporosis is a disease which has been important in the past, affecting Shamouti trees budded on sweet lime rootstock. The disease caused a drying out of the trunk and in the severest cases destroyed orchards. Affected groves which survived the disease apparently outgrow the difficulty with age. Dr. Peleg of the Israel Department of Agriculture, who has carried on a great deal of work on the subject, believes the difficulty may be overcome by eliminating high budding on sweet lime rootstock since it is apparent that the exposure of trunk of the sweet lime may have been one of the irritating factors. New groves soon to be planted will be budded low, and will give opportunity to study further the degree of control obtained under this new practice.

Mal secco is also present in Israel, but it is not serious due to the small plantings of lemon trees. Growers observed that during the frosts which occurred in January and February of 1950, the trees on low ground, and thus most severely affected by frost, were also more susceptible to Mal secco. There is no general control practiced except to remove diseased trees when the production is sufficiently impaired.

Gummosis has been a problem, particularly on heavy soils, and when furrow or basin irrigation was practiced, water was kept away from the tree trunks as a precautionary measure. With the use of sprinklers, this is impossible and an increase in both Gummosis and brown rot may be anticipated as a result of the change in the practice of irrigation.

The Israel Department of Agriculture has a competent staff studying disease problems, and Psorosis may be eliminated in the future by the registration of all nursery stock.

VIII. MARKETING

Picking and Packing

The emigration of Arab labor and the training of immigrants in picking and packing has been one of the greatest problems of the Israel citrus industry. This is strikingly indicated in the accompanying table which shows the increase in wages which has taken place for picking labor, with the average wage doubling since 1946. The wage alone, however, is not a measure of the increase in costs of picking, since the output of labor has been severely reduced because of the immigrants' inexperience in this type of work. In the 1949-50 season, the normal output per picker was only eight 90-pound boxes per day, and in the 1950-51 season, it is expected that the normal output per day will not exceed ten 90-pound boxes. This is a very small output considering the fact that the trees are closely planted, the fruit is exceptionally large, and the trees small and easy to pick.

Groves visited were using straight and tripod ladders and standard-type picking clippers and picking bags. Israel is the only place in the Mediterranean area where modern picking methods were observed. Because of the costs of labor, considerable research has been done in improving the efficiency of this operation, and some magnesium ladders have been imported to facilitate the work of the pickers. A new type ladder has also been designed by the Department of Agriculture which is a semi-tripod type with a platform on which a box will be rested in order to take the load of the picking bag off the picker.

The fruit is packed into field boxes weighing about 84 pounds, and these are brought out of the grove either by small hand trucks or by low-bed vehicles.

In Palestine the traditional packing plant was a very simple affair similar to that used in most Mediterranean countries, whereby the fruit was piled on the floor and graded, sorted and sized by hand. There are still many of this type of packing operations in Israel. However, there is a marked tendency toward modernizing the packing procedure, and the major effort which has been made is to bring the packing procedure off the floor by using locally manufactured grading tables and sorting bins. These are of rather simple manufacture, the fruit containers being of canvas, built into a light wood and metal frame. It does seem, however, that this equipment will be effective in improving the efficiency of the packing operation. In the old packing house it was customary to pile the fruit for 3 or 4 days to permit it to cure. This is not always done under the present system, and it is thought that some of the the trouble with brown rot is a result of this change 8/. There are a few modern packing houses in Israel, and some modern American equipment

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8/ When fruit is stored a few days it "cures" and the stings of the fruit fly become visable as light areas around each sting; this aids the grader in removing damaged fruit.

Table 7.-Israel: Wages in packing operations

Year	Graders		Packers and wrappers		Boxmakers, daily		Boxmakers, seasonal 1/		Box lifters	
	Israel pounds	U. S. dollars	Israel pounds	U.S. dollars	Israel pounds	U.S. dollars	Israel pounds	U.S. dollars	Israel pounds	U.S. dollars
	1.150	4.64	.950	3.83	1.500-	6.05	200.-	807.00	1.350	5.45
1946/47.....	1.250	5.04	1.000	4.04	2.250	9.08	270.	1089.45		
	1.400	5.65	1.150	4.64						
	1.250-	5.04	1.000-	4.04	1.650-	6.66	200.-	807.00	1.500	6.05
1947/48.....	1.500	6.05	1.250	5.04	2.500	10.09	270.	1089.45		
	1.850-	7.46	1.600-	6.46	2.250-	9.08	275.-	1109.62	2.250	9.08
1948/49.....	2.100	8.47	1.850	7.46	3.100	12.51	345.	1392.08		
	2.000-	5.60	1.600-	4.48	2.350-	6.58	275.-	770.00	2.250	6.30
1949/50 2/...	2.250	6.30	1.850	5.18	3.450	9.66	345.	966.00	(for 100 boxes in bags and 0.0225 Israel pounds for each additional box. In case of lifting without boxes, Israel £ 2.250 for 150 boxes. For each additional box 0.015 Israel pounds)	

1/ Seasonal payment is for 100 workdays during 5 calendar months.
2/ Since 1949/50 employers pay 8 percent for social benefits equal to payments in picking.

Source: Information obtained from Mr. Nussbaum, Agricultural Centre of Labor Federation by the office of the Commercial Attache, American Embassy, Tel Aviv.

Note: Changes demanded for 1950/51:

Graders	- 2.000 - 2.250	$ 5.60 - 6.30
Packers	- 1.600 - 2.000	4.48 - 5.60
Boxmakers	- 275.000 - 370.0	770.00 - 1036.00 (seasonal wage)
daily	- 2.370 - 3.700	6.58 - 10.36

Figure 7.--Picked grapefruit on the ground. This is a second picking after export fruit has been picked. Fruit is handled in this manner for the local market and processing.

Figure 8.--Worker picking grapefruit for the local market by dropping the fruit on the ground.

Figure 9.--A citrus packing house on a kibbutz communal settlement near Lake Tiberias.

Figure 10.--The interior of a kibbutz packing house using the new off-the-floor non-mechanical equipment.

Figure 11.--Field boxes of grapefruit ready to be taken to the small packing house in the orchard.

Figure 12.--Picking grapefruit for export.

Figure 13.--"Old-style" orange packing on the floor of a small orchard packing house.

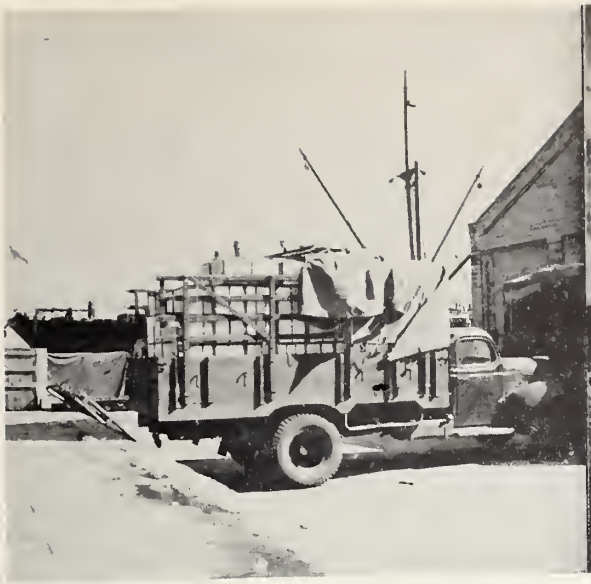


Figure 14.--Export oranges brought by truck to the port of Haifa.

Figure 15.--A citrus packing house.

Figure 16.--Oranges in dockside storage awaiting export.

Figure 17.--The interior of a packing house equipped with the non-mechanical off-the-floor packing aids.

Figure 18.--A close-up of the canvas bins used in packing. This equipment is made in Israel.

Figure 19.--Packing Shamouti oranges . The side of the canvas bin lets down for the packer.

was purchased with funds from the Import-Export Bank loan. Diphenyl-impregnated paper wraps are generally used in the industry for export fruit as a part of the requirement of the Citrus Marketing Board. In addition, the fruit is also given a gas treatment before being exported in common stowage.

Export and Domestic Marketing

The marketing of all citrus in Israel is controlled by the Citrus Marketing Board, which sells all fruit in export and controls the domestic marketing for both fresh and processed use as well. Due to the present shortage of fruit and the necessity of making exports to earn foreign exchange, oranges are rationed in Israel, with each citizen being allowed to purchase 250 grams of fruit per week. The Citrus Marketing Board is a powerful factor in the industry, and its present policy will largely direct the future of this industry. The difficulties of picking and packing mentioned above have indicated the need for further change in the packing operations with the utilization of more mechanical equipment. It is entirely likely that if additional dollar loans are made, a portion of such funds will be used to modernize this phase of the industry. If this is accomplished, it will require some change in the packing establishments and a consolidation of the packing operation to a greater extent than at present.

The present packing process being utilized would control most fungus but not brown rot, and therefore, further improvement in packing may necessitate the use of washes and dips in packing systems. If this is done, the packing method would be further modified. It should also be kept in mind that the use of diphenyl wraps is not satisfactory to some European customers who have objected to this type of package.

The story of citrus exports from Palestine and Israel are shown in table 9. Orange exports increased rapidly until the beginning of World War II.

In the 1920-21 season exports were less than 1 million boxes. They had increased to more than 13 million boxes by the 1938-39 season, which is the highest on record. During the war years from 1940 to 1945 the shipments to British military forces in the Middle East are not indicated. Other exports declined drastically. With the end of the war in Europe orange exports increased steadily to the 1947-48 season when over 8 million boxes were exported. Following this the Jewish-Arab war again reduced exports to about 3 million boxes for the 1948-49 and 1949-50 seasons. Since producing acreage has been permanently lost, orange exports are unlikely to exceed 4 million boxes in the next 8 years when acreage yet to be planted may begin to come into production.

The story of grapefruit exports is about the same as that of orange exports. Grapefruit is a more recent export item than oranges, and exports did not start until the 1928-29 season. Grapefruit acreage also has been destroyed and exports are unlikely to exceed 1½ million boxes per year in the next 8 years.

Lemons too have a similar record except that exports in the last 2 years have been negligible. Small production and domestic demand will keep exports at a low level in the next few years.

It is unlikely that total citrus exports from Israel will exceed 6 million boxes in any year in the next 8 years, and they will probably be at approximately the level of the 1949-50 season.

In tables 10-13 the citrus exports from Israel and Palestine are given by country of destination. Comparing the 1946-47 season with that of 1949-50 there has been little change in the export pattern and England is still the most important market, with the Scandinavian market second in importance. The small market in the "iron curtain" countries of Poland, Rumania, Bulgaria, Yugoslavia, and Czechoslovakia has been maintained. Since the Jewish-Arab war no exports have been made to the Arab middle east countries because of the existing trade embargo. The loss of these Arab customers, who were always a minor market, is the only significant recent change which has taken place. In the future, exports may be expected to follow the pattern of the 1949-50 season, and England will continue to be the most important market.

The small export of citrus to the United States in 1949-50 may be continued each year on the basis of supplying a market which will purchase on the basis of religious and sentimental grounds. Arrangements are being made to treat the fruit en route for protection against the infestation of the Mediterranean fruit fly. Due to the cost of transport, it would seem unlikely that such exports will reach any considerable volume and will probably be less than 100,000 boxes each year.

Citrus exports from Israel are seasonal. Exports of grapefruit begin in October and Northern Israel near Lake Tiberias supplies most of this early fruit. Shipments continue through May, but are nearly complete by the end of April. Orange exports start in November, but shipments are not made in volume until December. Shipments continue to May, but most fruit has been exported by the middle of April.

Israel is investigating the possibility of growing an early orange variety which might advance the export season. Some early variety oranges such as Hamlins and Washington navels may be planted. The season can not be extended by late varieties because of the activity of the Mediterranean fruit fly.

Haifa is the most important export port and there, ships can be brought to dock in the harbor. Exports of citrus are also made from Tel Aviv and Jaffa, but at those ports ships anchor off shore and cargo is handled by lighters. Of these two ports Jaffa has been handling the most fruit in recent years.

Table 8.-Israel: Citrus exports by port of shipment 1948-49

Port	Citrus exports	
	Cases	Percentage
Haifa	1,784,946	45.8
Tel Aviv	768,854	19.7
Jaffa	1,341,287	34.5
TOTAL	3,895,687	100.0

Source: Survey of the Citrus Industry in Israel 1948-49, by Mendes H. Sachs, Manager of Pardess Syndicate of Palestine Citrus Growers. From a Report by Malcolm P. Hooper, Commercial Attache, American Embassy, Tel Aviv.

The above tabulation indicates the comparative importance of export ports in Israel. In the future the relationship will be maintained pending port development at Jaffa.

Table 9.-Palestine: Exports of citrus fruits, 1920-21/1949-50

Season	Oranges	Grapefruit	Lemons	Total, including others	Percent of the Jewish Sector 4/
	Cases	Cases	Cases	Cases	Percent
1920/21	830,959				
1921/22	1,234,251				
1922/23	1,265,543				
1923/24	1,589,331				
1924/25	2,146,457				
1925/26	1,515,116		3,615	1,518,731	
1926/27	2,658,716		9,575	2,668,291	
1927/28	2,210,308		10,135	2,220,443	
1928/29	1,787,493	2,265	12,789	1,802,547	
1929/30	2,590,861	13,011	6,333	2,610,205	
1930/31	2,425,115	39,938	4,803	2,469,856	37
1931/32	3,584,949	105,811	7,729	3,698,489	37
1932/33	4,229,545	244,603	16,261	4,490,409	48
1933/34	5,157,777	353,250	22,323	5,533,350	51
1934/35	6,625,051	682,857	26,435	7,334,343	58
1935/36	4,992,254	843,811	50,336	5,886,401	60
1936/37	9,190,683	1,533,710	71,501	10,795,894	60
1937/38	9,573,271	1,794,118	77,019	11,444,408	60
1938/39	13,055,700	2,066,833	142,243	15,264,776	65
1939/40	6,448,608	987,528	154,329	7,590,465	
1940/41 2/	64,597	12,812	326	77,735	
1941/42 2/	31,279	2,762	10	34,051	
1942/43 2/	3,614	980	-	4,594	
1943/44 2/	532,041	841	1	532,883	
1944/45 2/	1,121,066	352,562	54	1,473,682	
1945/46 3/	4,044,165	832,842	51,674	4,898,833	
1946/47 3/	6,495,399	967,616	212,315	7,676,029	
1947/48 3/	8,489,874	1,261,489	161,463	9,918,083	
1948/49 3/	3,029,791	860,450	4,986	3,895,227	
1949/50 3/	3,363,780	838,749	19,081	4,221,610	

1/ Bulk exports not included here, were also made in same years. Palestine Government Statistics.

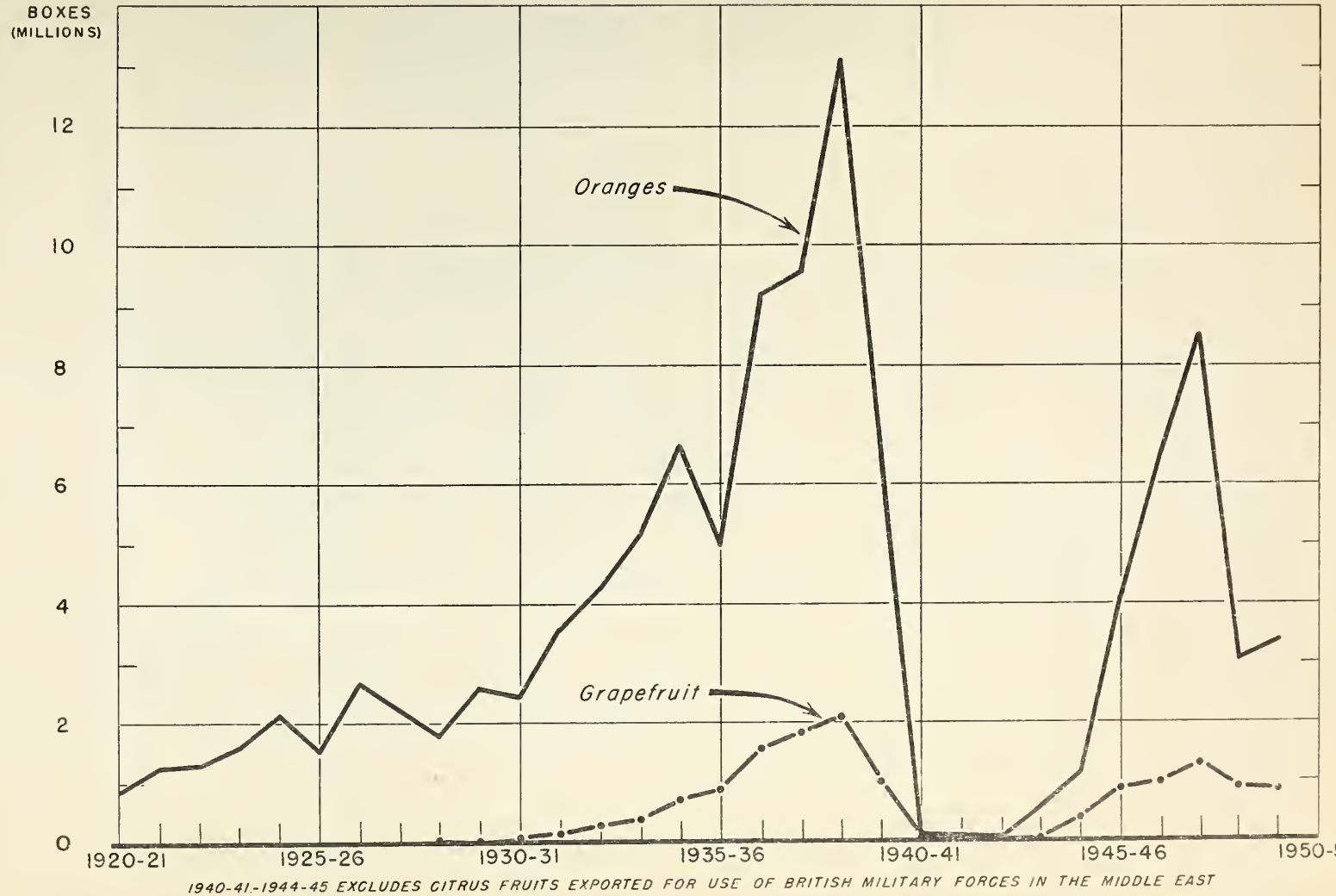
2/ Excluding citrus fruits exported for the use of British Military Forces in the Middle East.

3/ Citrus Marketing Board.

4/ Under the British Mandate, statistics on citrus acreage were kept separate according to Arab and Jewish ownership. This percentage refers to the production resulting from the Jewish-owned groves.

Source: Palestine Government Statistics and Citrus Marketing Board.

EXPORTS OF ORANGES AND GRAPEFRUIT FROM PALESTINE AND ISRAEL, 1920-21 - 1949-50



1940-41-1944-45 EXCLUDES CITRUS FRUITS EXPORTED FOR USE OF BRITISH MILITARY FORCES IN THE MIDDLE EAST

U.S. DEPARTMENT OF AGRICULTURE NEG. 1660 OFFICE OF FOREIGN AGRICULTURAL RELATIONS

Table 10.-Israel: Citrus fruit exports, Palestine, by kinds, by country of destination, 1946/47 season

Country of Destination	Citrus variety					
	Shamouti	Valencia	Grapefruit	Lemons	Other	Total
	cases	cases	cases	cases	cases	cases
United Kingdom	4,037,908	562,234	833,955	202,546	149	5,636,792
Ireland	187,455	39,037	12,471	-	-	238,963
Belgium	627,015	92,961	85,846	3,640	250	809,712
Holland	116,659	-	-	-	-	116,659
Sweden	337,759	17,751	510	-	-	356,020
Norway	280,053	-	-	2	-	280,055
Denmark	580	-	-	-	-	580
Iceland	8,400	-	500	600	-	9,500
France	1,732	1,795	400	-	-	3,927
Switzerland	3,902	1,650	16,377	-	-	21,929
Czechoslovakia	113,612	1,177	16,976	-	-	131,765
Rumania	1,541	33	128	5,004	300	7,006
Bulgaria	321	28	-	43	-	392
Malta	19,774	-	150	-	-	19,924
Turkey	-	-	-	200	-	200
Syria 1/	3	-	-	-	-	3
Lebanon 1/	-	-	3	-	-	3
Trans-Jordan 1/	2	-	-	-	-	2
Egypt 1/	-	14	-	-	-	14
Hedjas	3,000	506	-	100	-	3,606
Aden	6,388	400	-	-	-	6,788
Kuwait	12	-	-	-	-	12
Abyssinia	1,000	-	-	-	-	1,000
Eritrea	3,725	2,725	-	-	-	6,450
Sudan	3,927	1,150	-	50	-	5,127
Bahreih	400	-	-	50	-	450
India	250	-	-	50	-	300
Singapore	12,500	5,500	300	-	-	18,300
Hongkong	270	-	-	30	-	300
Faroe Islands	-	250	-	-	-	250
Total	5,768,188	727,211	967,616	212,315	699	7,676,029

1/ In addition to indicated exports of fruit in cases, the following was exported in bulk:

Country	Metric Tons	Boxes
Syria	9,693.240	305,282
Lebanon	16.	504
Trans-Jordan	795.725	25,060
Egypt	20.	630
Total	10,524.965	331,476

Source: Citrus Marketing Board, from the office of the Commercial Attache, American Embassy, Tel Aviv.

Table 11.-Israel: Citrus exports, by country of origin and variety, 1947/48

Cased Exports

Country	Citrus variety					
	Shamouti	Valencia	Grapefruit	Lemons	Clementines	Total
	cases	cases	cases	cases	cases	cases
Aden	1,100	-	-	-	-	1,100
Belgium	484	45	1	2,957	4,755	8,242
Bulgaria	54	23	-	6	-	83
Czechoslovakia	393,259	186	22,490	-	-	415,935
Denmark	231	65	9	-	-	305
Egypt	24	-	-	-	-	24
Eire	168,313	28,567	6,350	5,948	-	209,178
Erithrea	1,500	500	-	-	-	2,000
Faroe Islands	3,000	-	-	-	-	3,000
France	22,290	12,910	2	-	-	35,202
Germany	123	-	-	1	-	124
Hedjas	650	-	-	-	-	650
Holland	201,224	126	9	25	-	201,384
Hong Kong	257	-	200	80	-	537
Hungary	74	-	-	2	-	76
Lebanon	-	-	-	-	2	2
Italy	10	-	-	-	-	10
Malta	4,000	11,000	225	-	-	15,225
Norway	132	33	9	1	-	175
Poland	34,002	125	-	-	-	34,127
Rumania	684	46	-	2,438	-	3,168
Singapore	2,150	-	250	-	-	2,400
Somaliland (Fr.)	300	-	-	-	-	300
Sudan	1,310	-	-	-	-	1,310
Sweden	209,919	7,777	45,688	-	-	263,384
Switzerland	540	28	2,204	-	500	3,272
United Kingdom	6,819,011	563,748	1,184,050	150,005	-	8,716,814
Trans-Jordan	4	-	2	-	-	6
Yugoslavia	50	-	-	-	-	50
Total	7,864,695	625,179	1,261,489	161,463	5,257	9,918,083

Bulk Exports

Country	Citrus variety									
	Shamouti		Grapefruit		Clementines		Tangerines		Total	
	M.T.	Boxes	M.T.	Boxes	M.T.	Boxes	M.T.	Boxes	M.T.	Boxes
Syria	1,010	31,809	40	1,102	-		-		1,050	32,911
Trans-Jordan	251	7,905	-		70	2,205	20	630	341	10,740
Total	1,261	39,714	40	1,102	70	2,205	20	630	1,391	43,651

Source: Citrus Marketing Board, from the office of the Commercial Attache, American Embassy, Tel Aviv.

Table 12.-Israel: Citrus exports, by country of destination and variety, 1948/49

Country of destination	Shamouti oranges	Valencia oranges	Grapefruit	Lemons	Total
	cases	cases	cases	cases	cases
United Kingdom	1,946,950	286,831	808,477	-	3,042,258
Eire	99,037	30,001	5,963	-	135,001
Holland	300,000	-	-	-	300,000
Norway	28,500	-	-	-	28,500
Poland	36,400	-	4,000	-	40,400
Sweden	231,218	44,954	35,310	-	311,482
Rumania	900	-	100	-	1,000
Switzerland	-	-	1,600	-	1,600
Denmark	-	25,000	5,000	-	30,000
Bulgaria	-	-	-	4,986	4,986
Total	2,643,005	386,786	860,450	4,986	3,895,227

Source: Citrus Marketing Board, from the office of the Commercial Attache, American Embassy, Tel Aviv.

Table 13.-Israel: Citrus exports, by country of destination and variety, 1949/50

Country of destination	Shamouti oranges	Valencia oranges	Grapefruit	Lemons	Total
	cases	cases	cases	cases	cases
United Kingdom	1,799,147	80,000	580,015	-	2,459,162
Eire	87,892	32,500	6,500	-	126,892
Belgium	98,638	-	71,164	-	169,802
Holland	202,721	30,000	28,300	-	261,021
Sweden	269,783	94,770	37,707	-	402,260
Norway	145,000	-	5,000	-	150,000
Denmark	71,444	18,761	6,667	-	96,872
Finland	141,159	15,000	15,000	-	171,159
Poland	109,050	-	6,150	-	115,200
Rumania	21,594	-	390	10,944	32,928
Bulgaria	-	-	-	3,479	3,479
Yugoslavia	1,500	-	-	4,500	6,000
Czechoslovakia	84,760	-	16,162	-	100,922
Austria	28,300	-	-	-	28,300
Switzerland	5,600	14,000	61,194	-	80,794
France	-	7,000	4,500	-	11,500
United States	5,161	-	-	158	5,319
Total	3,071,749	292,031	838,749	19,081	4,221,610

Source: Citrus Marketing Board, from the office of the Commercial Attache, American Embassy, Tel Aviv.

Table 14.-Israel: Citrus exports, by months, 1938-39

Month	Oranges	Grapefruit
	Percent	Percent
October 1938	-	16
November "	8	8
December "	20	10
January 1939	25	12
February "	15	9
March "	20	21
April "	11	18
May "	1	6
Total	100	100

Source: Anglo-Palestine Yearbook, Volume 2, pp. 147-153, date - 1947-48.

Marketing Problems of the 1950-51 Season

Rising costs of production, together with the abandonment of government purchases of fruit in most Western European markets, combined to make unusual marketing problems for Israel's citrus industry in 1950-51. As in recent years, a delegation was sent to Europe to make sales of oranges at fixed prices. This delegation was divided into two committees: one called on countries in Western Europe and the other visited the countries behind the iron curtain. The difficulties encountered by this sales committee are set forth in an article entitled "A Disappointing Mission," which appeared on November 21, 1950, in the Hebrew language daily newspaper Davar 9/. This article states that the committee found conditions in Western Europe completely changed due to the decision of OEEC (the International Economic Trade Organization) to decontrol the government purchases of citrus fruits. Due to this decision, the purchase of citrus fruits was returned to the hands of private enterprise in most European market areas.

Under these conditions it was no longer possible to negotiate with governments and sell large quantities of fruit at fixed prices as in the past. The committee found that private importers were unwilling to assume the risk of large purchases at high fixed prices. Under these circumstances the committee returned to Israel with not more than 40 percent of the exportable crop sold. Moreover, only 20 percent of the exportable crop had been sold at a fixed price and the other 20 percent was contracted for at a guaranteed minimum price.

9/ From a translation from the Hebrew language made by Dr. J. H. Levien of the office of the Commercial Attache, American Embassy, Tel Aviv, Israel.

Other factors which hindered the making of successful sales included the quality of fruit shipped in the past from Israel and the type of export box now used. These problems in making sales of Israel citrus at fixed prices are set forth by the committee in the following quotation from the above mentioned newspaper article.

"What were the causes preventing successful sales? In the first place, there was the refusal of private business to take a risk after having relied for many years on allocations from the Government where there were no risks nor fluctuations. Secondly, in all these countries word had been received that as a result of larger crops in Spain, Italy, and North Africa, greater shipments at lower prices than last year could be expected. Fear that the market would be swamped by the Spanish with their adaptability to market conditions and ingenuity in manipulating currency was instrumental in preventing the favorable conclusion of our negotiations. We would, however, fail in our responsibility toward the future of the Israeli citriculture if we did not mention a special factor which greatly hindered our activities: the quality of the fruit marketed by us in the past, and especially during the last season. In most European countries we hear complaints regarding the decline in the quality of our fruit, that it was green and sour at the beginning of the season and frozen and tasteless during the later part.

"Our fruit is inferior to the produce of our competitors in three respects: Our grading is inadequate with respect to the quality and the exterior of the fruit. Its mixture with unexportable fruit contributes to a loss of reputation for 'Jaffas.' Secondly, we send too high a percentage of large-sized fruit which is not as acceptable commercially as smaller sizes. In this way we make the fruit more expensive to the customer and lower the value of the smaller sizes. Thirdly, we continue to pack our fruit in large boxes which are unpopular with all those concerned, beginning with the porter and ending with the retailer-grocer."

In this article it was stated further that the committee believed that the difference between good quality fruit and poor quality fruit would result in a difference in price of at least 10 shillings ($1.40) per box, and perhaps more. The article suggests as a solution to these difficulties that Israel ship smaller quantities of fruit but fruit of outstanding quality which would probably bring as large a return as larger quantities of fruit of inferior quality. This will permit a larger quantity of fruit to be sold for local consumption which will return to the grower a higher price than can be obtained for fruit in export. A further suggestion is made that the fruit must be properly selected and packed and that shipments should be organized in accordance with the demand of the market. It is also suggested that advertising be conducted in Western European markets in order to increase consumer demand for Jaffa oranges.

The citrus growers of Israel were seriously concerned with this situation and set forth their views on this question in a meeting November 27, 1950. In the addresses made at the meeting it was pointed out that the trade agreements recently negotiated with citrus consuming countries lacked suitable guarantees for the purchase of Israel citrus. In this regard the recent trade agreement with the Netherlands includes an item for the import of citrus from Israel in the amount of 750,000 Israel pounds. While these imports are permitted under the agreement, importers in the Netherlands were unwilling to make purchases at the fixed prices proposed by Israeli shippers. Thus even under a trade agreement which permitted trade in citrus this amounted to only a potential outlet and the problem of sales price still had to be met. In the trade agreements with Denmark, the citrus had not been added to the barter agreements concluded up to that time.

Citrus growers also pointed out at this meeting that negotiation with Great Britain had also been more difficult due to two facts. First, the tendency of fruit importers to increase their profit margins since the decontrol of citrus purchases by the government and second, importers were unwilling to bear the risk of paying high fixed prices for Israel oranges in view of the possibility of competition from large quantities of Spanish citrus fruits which could probably be purchased at a lower price. Larger orange crops this season in French Morocco, Italy, and Spain created a very competitive situation. Spain, the largest exporter of oranges, is the most competitive with Israel fruit. Growers pointed out that Spanish oranges were offered for sale at 16 shillings ($2.24) per box f.o.b., Spain, compared with a comparable price of 33 shillings ($4.62) per box f.o.b., Israel, for Israel Shamouti oranges. It was pointed out that even with this favorable price comparison the Spanish citrus grower also had additional aid in the right to retain 20 percent of the foreign exchange earned by the export of citrus, and also the grant of a special rate of exchange on the citrus sold in the sterling area and an additional government promise to cover production costs and generally to guarantee the Spanish citrus grower a reasonable profit.

At this meeting, growers stated that because of the competition and the changes in the European citrus market, the sales delegation up to November 27, 1950, had sold only 350,000 boxes at a fixed price of 28 shillings ($3.92) per box f.o.b., Israel, which is the same price obtained in the 1949-50 season. An additional 350,000 boxes had been sold on a consignment basis with a guaranteed minimum price of 25 shillings ($3.50) per box f.o.b., Israel.

An additional problem pointed out was the failure of the Government to allocate sufficient foreign currency for the purchase of packing materials in time to make such contracts at favorable prices. This delay resulted in making purchases at times and under conditions at which higher prices had to be paid in order to obtain deliveries in time for the packing season.

As a result of the discussion of the above problems, the central committee of the Farmers Association passed the following resolutions:

"1) The gravest concern is expressed regarding the conditions for marketing the crop in view of the approach of the Government which fails to provide the necessary basis for competing in foreign markets.

"2) The Board shall immediately enter into negotiations with the Government in order to bring about a decisive and immediate change towards a solution. The system of premiums currently in force is unable, both with respect to its structure and to the rate of the premiums, to provide such a solution.

"3) The Board and its representatives on the Citrus Marketing Board shall take steps to discontinue picking and shipping unless a satisfactory solution is reached by December 10, 1950." 10/

The problems pointed out in this meeting indicate how much the citrus grower must rely upon government policy to obtain a fair return for his fruit.

As the marketing season progressed it turned more favorable than had been anticipated at the end of November. This was partly due to better quality fruit which resulted from more favorable weather conditions since there had been very little rain and no frost damage. Trade sources indicate that during the first two weeks of the season very low prices were received for fruit sold in European markets, following which all shipments were completely stopped for about two weeks. The situation changed by late January, and small shipments to England were resumed and much more favorable prices were received. This was partially due to the small quantities of fruit offered so that the market would not be flooded at any one time. The market also was aided by an advertising campaign which created consumer demand by point-of-sale advertising. Trade sources indicate that in the first week of February an average of 36 shillings ($5.04) per box was received from sales in European markets.

At this time Israel can easily control the volume of fruit going to market because of the relatively small production. The supplies of fruit available for export were further reduced this year, partially due to the delay in shipments during the early part of the season, and partially due to a severe infestation of the Mediterranean fruit fly in southern Israel. This infestation was severe because of the extremely mild weather and the lack of rainfall.

10/ This resolution, together with information regarding the citrus growers meeting, is from a report prepared by O. L. Troxel, Commercial Attache and Dr. J. H. Levien of the Office of the Commercial Attache, American Embassy, Tel Aviv. The resolution and the information on the meeting are a translation from the Hebrew language by Dr. Levien.

In February 1951 trade sources indicated that the following exports will probably be made this year: 500,000 boxes of grapefruit, 500,000 boxes of Valencias, about 3,000,000 boxes of Shamoutis, and about 15,000 boxes of lemons. Considerably more grapefruit could be exported if the market would justify additional shipments. It is further estimated that at least a million boxes of oranges and grapefruit will be sold in domestic markets of Israel as fresh fruit and approximately 2 million boxes will be sent to the processing plants. This fruit will be primarily Shamouti oranges. It is expected that about 40,000 boxes of lemons will also be processed this year.

In the 1950-51 season Israel has been faced with marketing problems, but the prices obtained seem to indicate that these can be met successfully if proper merchandising practices are followed. It is evident that controlling shipments, keeping the volume of fruit in the market at reasonable levels, and using advertising to encourage consumer demand have been great aids to obtaining satisfactory prices. From the point of view of the citrus grower the present volume of Israel's production can be disposed of at profitable prices provided full utilization is made of the domestic market. The growing population in Israel due to immigration will consume considerable volumes of citrus both as fresh fruit and in the form of processed products, primarily citrus-flavored soft drinks. The fact that citrus fruits have to be rationed is indicative of the consuming power of this market. While this domestic market is a profitable outlet for large supplies of citrus fruits, it is in the interest of the national economy that as much citrus as possible be exported in order to earn foreign exchange.

Table 15.-Israel: An estimate of the domestic consumption of citrus in Israel in the season 1948-49

Variety	Consumption					
	Processing		Fresh Domestic Use		Total	
	Metric tons	Boxes	Metric tons	Boxes	Metric tons	Boxes
Shamouti orange...	65,500	2,062,876	12,500	393,679	78,000	2,456,555
Valencia orange...	100	3,150	5,900	185,816	6,000	188,966
Grapefruit.....	6,200	170,857	1,500	41,336	7,700	212,193
Lemons.....	2,700	78,321	1,300	37,710	4,000	116,031
Total.....	74,500	2,315,204	21,200	658,541	95,700	2,973,745

Source: Survey of the Citrus Industry of Israel, 1948-49, by Mendes H. Sachs, Manager of Pardess Syndicate of Palestine Citrus Growers Co-op Society, Ltd. Made available by Malcolm P. Hooper, Commercial Attache, American Embassy, Tel Aviv, Israel.

Methods of sale which were satisfactory when all citrus was purchased by governments are not satisfactory under the present conditions of private trade. Further changes in packing and marketing probably will be necessary before Israel again is able to sell its citrus fruits at competitive prices in European markets.

Some Competitive Factors

The ability of Israel Shamouti oranges to compete with other citrus is shown in the accompanying tabulation of auction prices of oranges at Antwerp, Belgium, on February 26, 1951. Prices of Spanish comunas, cadeneras, blood ovals, and California navels are compared with the prices of Israel Shamoutis. A weakness of the Shamouti is seen in the lower prices for the large fruit. This variety tends to run to large sizes in Israel. The general run of prices is competitive with the other varieties.

A comparison of the weights of the boxes indicates Israel's large box is about 20 pounds heavier on the average than the boxes used by competitors. This is traceable to the large size of the fruit. If a smaller box were used, the box count of fruit would have to be less than that of most competitors. Thus in a smaller box a large percentage of Israel Shamoutis would be 150's and larger.

When the prices are compared in terms of cents per pound Israel is still reasonably competitive, with the exception that the larger sizes of fruit sold for lower prices than that of the competitors.

A comparison of the auction prices of grapefruit on the same day indicates that Israel White grapefruit is reasonably competitive with the Texas White grapefruit. The sales prices are nearly identical, but the heavier Israel box makes the Israel fruit cheaper than the Texas fruit by the pound. The difference is not great, however.

When Israel ships properly graded and packed fruit, she can compete on European markets. The cost at which such fruit can be produced is the important factor.

If orange export prices were to average 1 pound sterling per box f.o.b., Israel, growers would incur heavy losses at present production costs. During the past season Spanish oranges were sold f.o.b., Spain, at less than 1 pound per box.

Citrus growers in Israel are, therefore, in an uncertain position and on the basis of comparative costs of production, they cannot compete with other Mediterranean suppliers. From a point of view of the Israel citrus grower, the outlook for profit is not bright.

Table 16.-Antwerp: A comparison of the auction price of specified orange varieties on February 26, 1951 1/

Size in Fruit Count per box	Spain: Comunas (seeded) Box Wt.	Spain: Comunas (seeded) Belgian Francs	Spain: Comunas (seeded) U. S. Dollars	Spain: Cadeneras (seedless) Box Wt.	Spain: Cadeneras (seedless) Belgian Francs	Spain: Cadeneras (seedless) U. S. Dollars	Spain: Blood Oval (double fina) Box Wt.	Spain: Blood Oval (double fina) Belgian Francs	Spain: Blood Oval (double fina) U. S. Dollars	California: Navel Box Wt.	California: Navel Belgian Francs	California: Navel U. S. Dollars	Israel: Jaffa (Shamouti) Box Wt.	Israel: Jaffa (Shamouti) Belgian Francs	Israel: Jaffa (Shamouti) U. S. Dollars
	Lb.	Francs	Dollars	Lb.	Francs	Dollars	Lb.	Francs	Dollars	Lb.	Francs	Dollars	Lb.	Francs	Dollars
126	84	240	4.77	86	280	5.56									
150	82	240	4.77	86	280	5.56	84	250	4.97	84	260	5.17	104	272	5.41
176	84	265	5.27	88	300	5.96	82	260	5.17	84	270	5.37			
180													106	287	5.70
200	84	265	5.27	90	300	5.96	86	260	5.17	84	272	5.41			
210													101	297	5.90
216	84	265	5.27	88	300	5.96	84	260	5.17						
220										82	272	5.41			
240													104	310	6.16
252	86	265	5.27	88	300	5.96	86	265	5.27	84	265	5.27			
288	84	252	5.01	90	272	5.41	86	265	5.27	82	265	5.27			
294													104	312	6.20
324	86	252	5.01	90	272	5.41	86	265	5.27						
336															
392										82	255	5.07			

1/ Modal averages taken from Priced Auction Catalogs by inspection.

Source: From Priced Auction Catalogs and from personal observations in fruit markets of Antwerp.

Table 17.-Antwerp: A comparison of the auction price of Israel and Texas White grapefruit on February 26, 1951, modal averages by inspection

Sizes	Israel			Texas		
	Weight of Box	Price		Weight of Box	Price	
		Belgian Francs	U. S. Dollars		Belgian Francs	U. S. Dollars
	Pounds	Francs	Dollars	Pounds	Francs	Dollars
80....	88	315	6.26			
96....	90	337	6.70	86	322	6.40
112....	93	345	6.86	86	337	6.70
126....				86	345	6.86
150....	101	360	7.16			

Source: From Priced Auction Catalogs.

Table 18.-Antwerp: A comparison of the Antwerp auction prices per pound of specified orange varieties on February 26, 1951 1/

Size Box Count	Spain			California	Israel
	Comunas (seeded)	Cadeneras (seedless)	Blood Oval (double fina)	Navel	Jaffa (Shamouti)
	U. S. Cents	U. S. Cents	U. S. Cents	U.S. Cents	U.S. Cents
126....	$ 0.0568	$ 0.0647			
150....	0.0582	0.0677	$ 0.0592	$ 0.0615	$ 0.0520
176....	0.0627	0.0677	0.0630	0.0639	
180....					0.0538
200....	0.0627	0.0662	0.0601	0.0644	
210....					0.0584
216....	0.0627	0.0677	0.0615		
220....				0.0660	
240....					0.0592
252....	0.0613	0.0677	0.0613	0.0627	
288....	0.0595	0.0601	0.0613	0.0643	
294....					0.0596
324....	0.0583	0.0601	0.0613		
336....					
392....				0.0618	

1/ Modal average taken from Priced Auction Catalog.

Source: Priced Auction Catalogs of Gerard Koninckx Freres and the firm of Leon Van Parys.

IX. COST OF PRODUCTION AND RETURNS TO THE GROWER

Cost of Production

In the accompanying cost studies the changes in the costs of grove operation before the war, after the war, and in 1950 are indicated. The major factors in these changes are clearly indicated by the increasing wage rates.

Table 19.-Israel: Wages per day for orchard work

Year	Wages per day	
	Israel Pounds	United States Dollars
	Pounds	Dollars
1938	.150	$ 0.73
1945	.500	2.02
1950	1.700	4.76

Source: Trade sources, from the office of the Commercial Attache, American Embassy, Tel Aviv.

Table 20.-Israel: Cost of cultivating a dunum containing 60 trees, before the war (1938) 1/

Item	Cost	
	Israel Pounds per dunum	Dollars per acre
	Pounds	Dollars
Hoeing, care of irrigation basins, etc. ... 6 working days		
Watering ... 3½ " "		
Pruning of trees ... 4 " "		
Distribution & covering of manure & fertilizer ... 3 " "		
Air-holes & whitewashing of trunks 1 " "		
Pest control, binding, cleaning, etc. ... 1½ " "		
Total (at 150 mils per day) ... 19 " "	2.850	$ 56.39
Water 600 m^3 at 3 mils	1.800	35.61
Organic manure, 4 tins per tree	1.200	23.74
Chemical fertilizers	0.750	14.84
Tools, raffia, cords, ointments, etc	0.500	9.89
Supervision, watching, general expenses	1.500	29.68
Pest control (work and materials)	1.000	19.79
Amortization, repairs, fire insurance	1.000	19.79
Total	10.600	209.73

1/ This does not include Government taxes and dues payable to Growers' Associations, nor interest on cultivation loans.

Source: The Palestine Tribune, November 15, 1945, Vol. I, No. 42, 280.8 P172 Cop. I.

Table 21.-Israel: Cost of cultivating a dunum containing 60 trees (1945)

Item		Cost	
		Israel Pounds per dunum	Dollars per acre
		Pounds	Dollars
Hoeing, care of irrigation basins, etc.	6 working days		
Watering	3½ " "		
Pruning of trees	4 " "		
Distribution & covering of manure & fertilizer	3 " "		
Air-holes & whitewashing of trunks	1 " "		
Pest control, binding, cleaning, etc.	1½ " "		
Total (at 500 mils per day)	19 " "	9.500	$ 155.13
Water 600 m^3 at 4 mils		2.400	39.19
Organic manure		3.600	58.79
Chemical fertilizers		2.000	32.66
Tools, raffia, cords, ointments, etc		1.000	16.33
Supervision, watching, general expenses		3.000	48.99
Pest control (work and materials)		2.000	32.66
Amortization, repairs, fire insurance		1.500	24.49
Total		25.000	408.24

Source: The Palestine Tribune, November 15, 1945, Vol. I, No. 42. 280.8 P172 Cop. I.

Table 22.-Israel: An estimate of the average cost of operating a citrus grove in Israel in 1950

Item	Costs of Operation	
	Israel Pounds per dunum	U.S. Dollars per acre
	Pounds	Dollars
Manual labor	5.00	$ 56.66
Weed control	1.50	17.00
Chemical fertilizer	3.00	33.99
Pest control	3.00	33.99
Water for irrigation	4.00	45.33
Local taxes and guard	1.00	11.33
Supervision	2.00	22.66
Administration	2.00	22.66
Miscellaneous	1.00	11.33
Total	22.50	254.95

Source: M. H. Sachs, Manager, Pardess Syndicate of Palestine Citrus Growers, Tel Aviv.

Table 23.-Israel: Citrus production costs

Item	Cost	
	Israel Pounds per dunum	Dollars per acre
	Pounds	Dollars
Wages		
Cleaning, repairing, and digging of wells, at a rate of 25 trees a day, 2 days	3.740	$ 42.38
Irrigation, 3½ days	6.545	74.16
Fertilizing with chemical fertilizer, 1/5 day	0.375	4.25
Uprooting of weeds in summer, 1½ days	2.805	31.78
Clipping of branches (4 days every 2 years)	3.740	42.38
Cleaning of wells & preparing organic manure (for 25 wells every 2 years), 2 days	1.870	21.19
Fertilizing by organic manure (3 cans per 100 trees daily every 2 years), ½ day	0.470	5.33
Total	19.545	221.47
Materials		
Water	4.500	50.99
100 kgs. of chemical fertilizers (including freight and porterage)	4.000	45.33
Organic manure (at a rate of 3 containers every 2 years on each tree)	3.000	33.99
Total	11.500	130.31
Fight Against Insects and Diseases		
Sulfate	1.250	14.17
Spraying (actual expenses 6,000 Israel pounds, but Government participates 50 percent and spraying of 1/3 of the total area annually is done)	1.000	11.33
Total	2.250	25.50
Sundries		
Taxes and guards	1.000	11.33
Renewal of equipment and repair of tools	3.000	33.99
Supervision (management)	2.000	22.66
Total	6.000	67.99
Grand Total	39.295	445.27

Source: Prepared by Federation of Jewish Farmers (for a 75-boxes crop per dunum at wage rate of 1.870 Israel pounds, i.e., 1.700 Israel pounds plus 10 percent), 1950.

NOTE: As a result of mechanized irrigation of a large part of groves and the prevailing shortage of organic manure, some adjustment has to be made in respect of groves now using mechanized irrigation and substituting additional chemical fertilizer for organic manure. For groves using

mechanized culture, the following adjustments in the above costs should be considered:

Under "Wages"

	Israel Pounds	U. S. Dollars			Israel Pounds	U. S. Dollars
Delete	3.740	$ 42.38	Add:	tractor ploughing	1.500	$ 17.00
"	1.870	21.19				
"	0.470	5.33				
	6.080	68.90				

Thus the total of 19.545 Israel pounds per dunum ($221.47 per acre) is reduced to 14.965 Israel pounds per dunum ($169.58 per acre).

Under "Materials"

	Israel Pounds	U. S. Dollars			Israel Pounds	U. S. Dollars
Delete	3.000	$ 33.99	Add:	chemical fertilizer	1.000	$ 11.33

Thus the total of 11.500 Israel pounds per dunum ($130.31 per acre) is reduced to 9.500 Israel pounds ($107.65).

The grand total of costs in mechanized groves is thus reduced from 39.295 Israel pounds to 32.715 Israel pounds per dunum ($445.27 to $376.71 per acre).

Under "Fight Against Insects and Diseases"

As mentioned, the amount of 1,000 Israel pounds per dunum ($11.33 per acre) for spraying does not cover the actual total required expenditure. If the actual amount of 6.000 Israel pounds per dunum ($67.99 per acre) is substituted, total production costs would be 43.045 and 36.465 Israel pounds per dunum ($487.76 and $413.20 per acre).

Costs of operation vary greatly between groves, particularly in the amount of fertilizer used, the cost of water, and pest control.

The costs shown in Table 22 are based on care in which half the grove is sprayed each year and only chemical fertilizers are used. The costs of cultivation are an estimated average of the various methods now employed, mechanical cultivation and non-tillage and sprinkler irrigation, and irrigation by the old basin system and furrow irrigation.

Most growers are unable to obtain or pay for manure. However, when it can be obtained, the present cost of an application is 10 Israel pounds per dunum ($113.00 per acre).

Table 24.-Israel: A summary of the cost of citrus materials, 1950

Item and Country of Origin	Unit	Price	
		Israel Pounds	U.S. Dollars
PACKING MATERIALS:		Pounds	Dollars
Tissue paper wrap			
Sweden	Ton, c.i.f.	103	$ 288
Norway	Ton, c.i.f.	103	288
United States	Ton, f.a.s.		225
Boxes (Type #74)			
Austria	Each, f.o.b.		0.41 - 0.42
Finland	Each, c.i.f.		0.62
Norway			
Poland	Each, c.i.f.		0.62 - 0.66
Yugoslavia	Each, c.i.f.		0.48
Nails			
Czechoslovakia	Ton, c.i.f.	47	132
France	Ton, f.o.b.		141 - 155
CULTURAL MATERIALS			
Sulfate of ammonia	Ton	27.50	77
Chile nitrate	Ton	27.50	77
Cost of spraying per tank of 100 gallons (application only)		0.49 - 0.57	1.37 - 1.60
Spray oil (material)	Ton	82.00	230.00

Source: Prices obtained by the office of the Commercial Attache, American Embassy, Tel Aviv, Israel, from trade sources.

Table 25.-Israel: A summary of cost of operation data

Year	Total Costs of Operation	
	Israel Pounds per dunum	U.S. Dollars per acre 1/
	Pounds	Dollars
1938	10.600	$ 209.73
1945	25.000	408.24
1950 (High Estimate)	39.295	445.27
1950 (Low Estimate)	22.500	254.95

1/ These values are converted at the official rate of exchange. In 1950 the official value of the Israel pound was $2.80. However, the "free" rate was about $1.40 in the fall of 1950. The costs of operation would be about half the indicated figure in 1950 if the "free" rate of the Israel pound had been used.

Table 26.-Israel: Estimated break-even costs of producing oranges f.o.b., Israel

Item	High		Low	
	Israel Pounds	U.S. Dollars	Israel Pounds	U.S. Dollars
	Pounds	Dollars	Pounds	Dollars
Cost of grove operation				
in 1950, per dunum	40.	$ 112.00	22.50	$ 63.00
per acre	162.	453.60	91.06	254.97
Average production of oranges in commercial groves, in 90-lb. boxes				
per dunum 110-75				
per acre 445-304				
Average range of cost of production per 90-lb. box. At a production of				
110 boxes per dunum	.36	1.01	.20	.56
At a production of 75 boxes per dunum	.53	1.48	.30	.84
Range of cost of production per 90-lb. box	.53	1.48	.20	.56
Cost of picking, packing, transport to ship	1.10	3.08	.85	2.38
Range of break-even costs of export oranges f.o.b., Israel	1.63	4.56	1.05	2.94

Source: An estimate compiled from information from trade sources and personal observations.

In addition to the increase in wages, the usual grove also has had to train new labor, who have not been as efficient as the former workers.

The cost studies of grove operation and the indicated range of picking and packing costs have been summarized in an estimate of the break-even costs of a packed box of oranges f.o.b., Israel. It will be noted that a higher than average yield has been used, but this is in accordance with the writer's observation of crops in commercial groves. It would seem that at least 50 percent of the groves in Israel have break-even costs lying in the range indicated in this estimate. Considering the probable price of oranges in European markets in the next few years, which seems unlikely to run more than 1 pound 11/ per box f.o.b., Israel, it would seem that not over 10 percent of the present groves in Israel would be able to pay expenses without government subsidy.

11/ 20 shillings ($2.80).

With increasing world prices for materials which must be imported, such as box shooks and fertilizers, and the increased wage rates in Israel, it seems likely that the present cost of production will increase in the next few years. At present costs, Israel is not competitive with other competing Mediterranean areas; the new groves to be planted under modern methods will not produce as high a yield as the old hand-operated grove, and certainly no great saving per box in costs of production will be achieved.

Returns to the Grower

The table on average citrus export prices and estimated revenue per box on the tree gives a reasonably current picture of returns to growers in the 1949-50 season. It is evident that the average f.o.b. sales price, including export subsidy, about covered the estimated break-even costs of producing citrus in Israel. This is not a fair comparison today, however, because in the 1949-50 season Israel was still selling fruit to governments at fixed prices.

We estimated the cost of production of citrus in 1950 as ranging from .200 to .530 12/ Israel pounds. The estimated revenue per box on the tree for the 1949-50 season varied from .174 to .750 Israel pounds. Therefore, when the export fruit was sold at high fixed prices the returns to growers seemed to more than pay the cost of production, except on that fruit which was sold for processing.

Growers are not making a large return per acre under the best circumstances and many growers complained about losses incurred on recent returns. From the point of view of profit, many other crops 13/ will return the farmer more per acre than citrus.

12/ The Israel pound is used to express costs and returns because this period covers the time of the devaluation of the pound, which makes converted dollar values unrealistic.

13/ Almost any food crop for the local market.

Table 27.-Israel: Average citrus export prices, picking and packing costs and net returns on the tree, by varieties, 1949-50

Variety	Quantity sold	Average f.o.b. sales price, including export subsidy		Estimated expenses from tree to ship		Estimated revenue per box on the tree		Total revenue	
	Boxes	Pounds per box	Dollars per box	Pounds per box	Dollars per box	Pounds per box	Dollars per box	1,000 pounds	1,000 dollars
	Boxes	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Shamouti	3,100,000	1.600	$ 4.48	1.075	$ 3.01	.525	$ 1.47	1,627.5	$4,557.00
Valencia	380,000	1.900	5.32	1.150	3.22	.750	2.10	285	798.00
Grapefruit	900,000	1.400	3.92	1.000	2.80	.400	1.12	360	1,008.00
Low quality fruit for processing and domestic consumption	2,362,072	-		-		.174	.49	397.5	1,113.00
Total								2,670.0	7,476.00

Source: Obtained by the office of the Commercial Attache, American Embassy, Tel Aviv, from Citrus Season 1949-50, by R. B. S., published in Haarez May 31, 1950.

X. THE PROCESSING INDUSTRY 14/

Processing has been a part of the citrus industry of Israel for nearly 30 years, with the first factory being established in 1922 when Assis first started production, followed by the second oldest plant in 1930, Jaf-Ora. The difficulties of marketing fresh fruit during World War II stimulated the growth of the processing industry, due to the strong demand for concentrated citrus juices. During this time, three additional factories were established by collective agricultural settlements, and eight additional by private enterprise.

At the end of the war, the citrus processors were joined together in the Citrus Concentrates Bottlers' Association, which at present has 12 member plants. This organization has been important in unifying this industry and in centralizing its interests, both research and commercial. The marketing of all citrus concentrates is carried out by this organization, and as sales are made, the production is allocated to the several plants. Competition between individual producers is thus avoided.

The industry is well developed today, and is capable of producing a great variety of processed products. It has the capacity of utilizing over 100,000 tons of citrus fruits each year.

List of Citrus Byproducts Made in Israel 14/

Concentrated Citrus Juices

- 65° Brix concentrated orange juice
- 61° Brix concentrated orange juice
- 43° Brix concentrated orange juice
- 54° Brix concentrated grapefruit juice
- 39° Brix concentrated grapefruit juice
- 33.5° Brix concentrated lemon juice

Pure Pasteurized Citrus Juices

- Orange juice
- Blended juice (50/50 orange and grapefruit)
- Grapefruit juice

Natural Citrus Raw Juices

- Orange raw juice
- Grapefruit raw juice

Citrus Pulps for Marmalade Making

- Bitter orange pulp
- Sweet orange pulp
- Grapefruit pulp
- The same pulps, sterilized

Citrus Peels in Brine for the Manufacture of Candied Fruit

- Orange, lemon, or grapefruit, halved peel in brine
- Bitter orange peel in brine

Citron (Ethrog) in Brine

- Halved fruit in brine

Canned Grapefruit Slices in Sugar Syrup

14/ From an article in the Israel Export Journal of February, 1949, p. 7, by Joseph Braverman and David Marcus.

Figure 20.--The fruit storage bins at the Priman plant.

Figure 21.--The Priman plant at Tel Aviv.

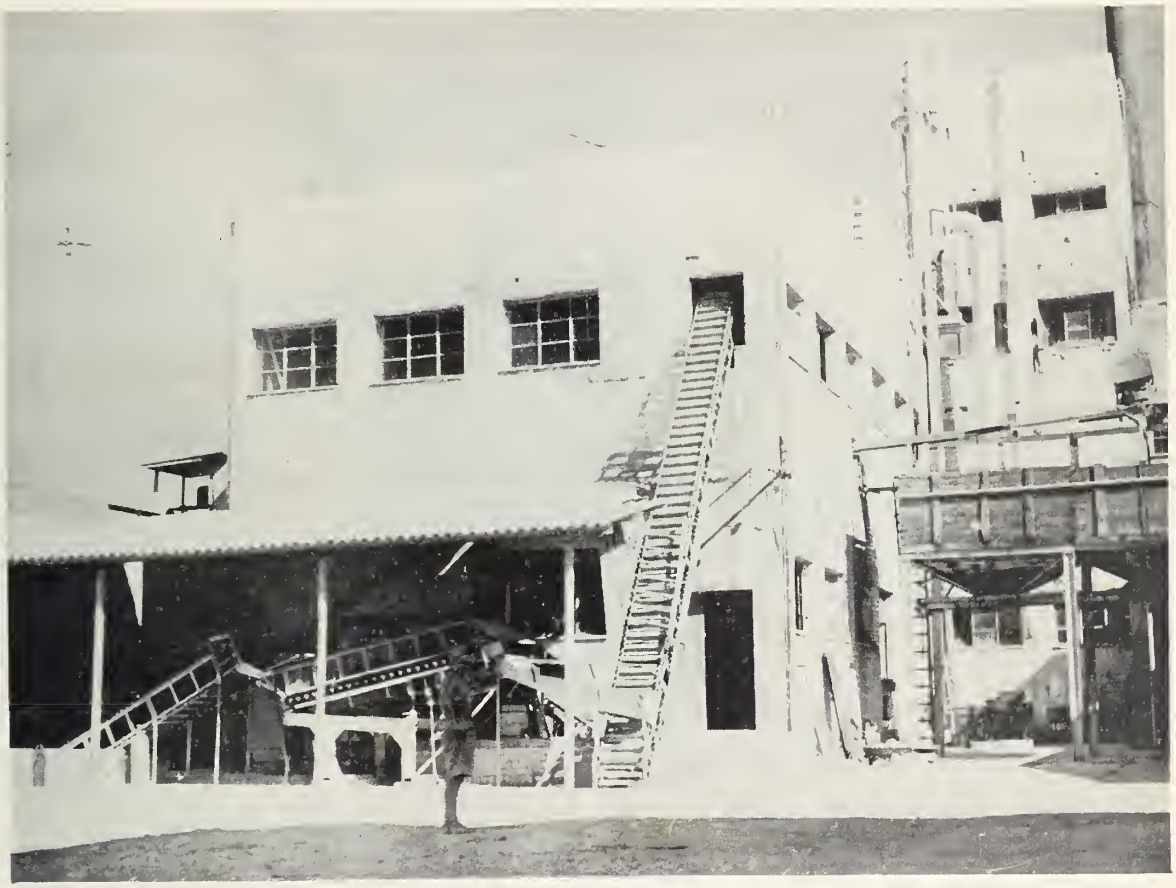


Figure 22.--The fruit washer and essential oil extractor at Priman.

Figure 23.--A view of the Assis plant at Tel Aviv.

Figure 24.--The Assis processing plant, largest in Israel.

Figure 25.--A fruit storage bin. The platform in the foreground is an elevator which raises the front wheels of trucks dumping fruit.

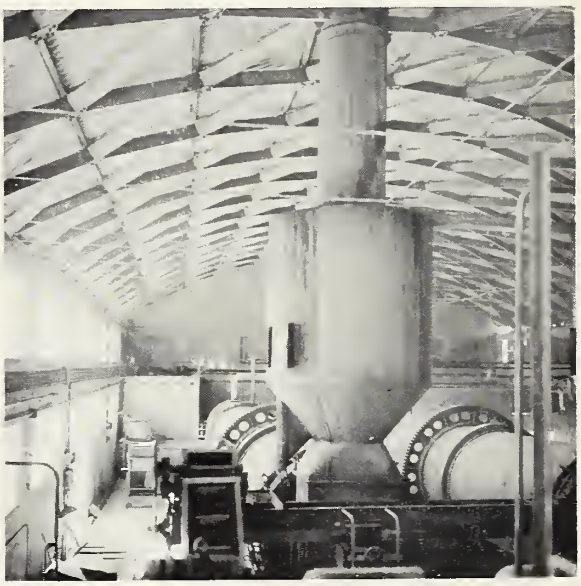


Figure 26.--Peel dehydrating equipment at Assis.

Figure 27.--Juice extractors of American manufacture.

Figure 28.--Concentrators of American manufacture.

Figure 29.--The plant of Jaf-Ora is located in an old winery at Rehout.

Figure 30.--Glass-lined wine tanks used to store orange juice for the production of squash for domestic consumption. Jaf-Ora.

Figure 31.--The bottom of a concentrating tower.

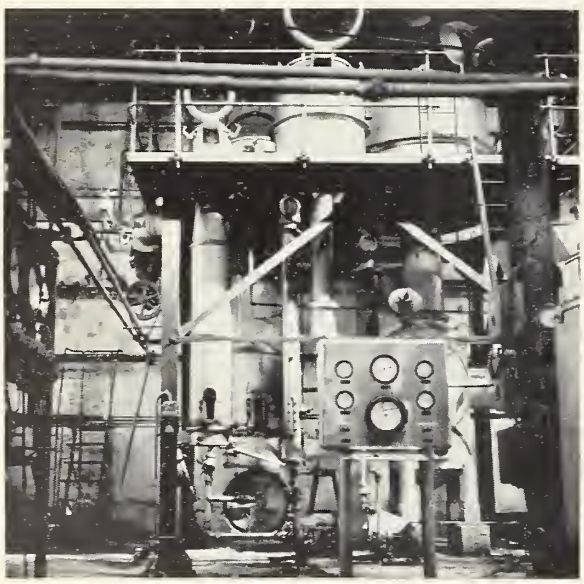


Figure 32.--A concentrator of English manufacture.

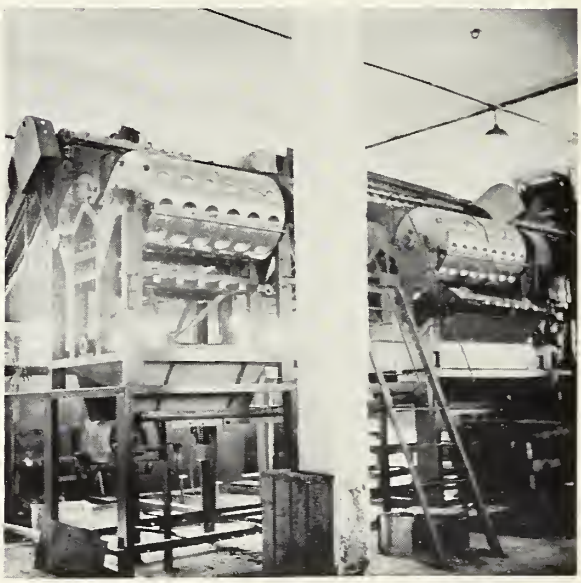


Figure 33.--A juice extractor manufactured in Israel is used at Priman.

List of Citrus Byproducts Made in Israel, continued

Natural Citrus Raw Juices, cont.

Lemon raw juice

Citrus Fruit Cells for the Manufacture of Beverages

Orange, grapefruit, and lemon cells
Orange or grapefruit cells, sterilized

Orange Paste for the Manufacture of Beverages

Citrus Essential Oils

Orange, lemon, grapefruit
Terpeneless oils
Terpenes
Dry cattle fodder
Ethyl alcohol
Naringin
Molasses
Pectin and pectates 15/

The marketing difficulties in World War II, followed by the "War for Independence," resulted in conditions which made it impossible for many growers to maintain their groves. This resulted in a reduction in the amount of fruit available for processing. In the 1949-50 season, less than one-half the capacity of 100,000 tons was utilized.

Table 28.-Israel: Utilization of fresh fruit for processing

Season	Oranges		Grapefruit		Lemons		Other		Total fruit	
	M.T.	Boxes	M.T.	Boxes	M.T.	Boxes	M.T.	Boxes	M.T.	Boxes
1947/48	86,004	2,708,635	2,933	80,826	2,681	77,770			91,618	2,867,231
1948/49	65,631	2,067,002	6,151	169,506	2,301	66,747	36	1,134	74,119	2,304,389
1949/50	40,522	1,276,212	5,518	152,062	2,478	71,882			48,518	1,500,156

Source: Citrus Concentrates Bottlers' Association.

Due to the difficulties of obtaining adequate supplies of fruit for processing, the industry has not been able in recent years to meet all demands, and therefore, processing plants have sought other products, such as tomato purees, with which to utilize their plant capacity.

Available statistics indicate the general trend in production of processed products and the great reduction in total supplies is clearly indicated in the period from 1947-1950.

15/ Probably not being produced in 1951.

Table 29.-Israel: Production of citrus processed products (Palestine)

Product	Year			
	1943	1944	1945	1946
	tons	tons	tons	tons
Raw juices	1/	9,600	7,500	7,500
Squashes	7,200	4,700	3,800	3,100
Pasteurized juices	2/	1,600	3,600	2,700
Concentrates	1,200	1,400	1,000	1,400
Canned fruits	1/	150	320	170
Total	8,400	17,450	16,220	14,870

1/ No figures available.
2/ No production.

Source: Official Palestine Government sources, as reported by the office of the Commercial Attache, American Embassy, Tel Aviv.

Table 30.-Israel: Production of citrus products

Season	Citrus Products							
	Raw Juices	Concentrated Juices	Pasteurized Juices	Fruit Cells	Pulps	Peels in Brine	Essential Oils	Total
	tons	tons	tons	tons	tons	tons	tons	tons
1947/48	751	4,454	5,425	636	6	6	78	11,356
1948/49	1,900	3,862	756	639	153	147	76	7,533
1949/50	1,434	2,388	305	475	186	122	59	4,969

Source: Citrus Concentrates Bottlers' Association.

Since 1947, marketing has presented no problem as regards processed products, either for exports or domestic consumption. In exports, the most important product is concentrated orange juice, which is primarily 65 Brix, for which the largest customer is the Ministry of Food in the United Kingdom. Czechoslovakia, the Netherlands, and Sweden also are important customers. In the 1947-48 season, a large quantity of single-strength juice was produced. However, the volume of this product has been reduced in subsequent years due to the more pressing need to export concentrate, and also due to the shortage of tin plate. The export of peels in brine and essential oils has been maintained to a greater extent than has the export of other citrus products.

In the domestic market there is a large demand for squash products, many of which are similar to those manufactured in England, and some of which are syrups consisting of one-half citrus juice and one-half sugar. The local demand for such products can not be satisfied at present.

Table 31.-Israel: Exports of citrus products, 1947-48, 1948-49 and 1949-50 1/

Year and Country of Destination	Concentrated Citrus Juices	Pasteurized Juices	Fruit Cells	Pulps	Peels in Brine	Essential oils
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1947-48						
United Kingdom	8,691,867	10,920,447	1,279,830			75,938
Aden	6,603					
Australia	-					968
Czechoslovakia	440,157					10,988
Denmark	-			11,215		
Ireland(Eire)	-			4,495		
Finland	2,167					
France	-	68,349	7,068			1,091
Netherlands	168,833		1,495			3,527
Hungary					12,897	273
Malta	6,265		2,200			
Norway	212					
Singapore	41,940					
Sweden	115,248		1,102			1,387
Switzerland	8,783					
Total	9,482,075	10,988,796	1,291,695	15,710	12,897	94,172
1948-49						
United Kingdom	6,698,715	-	456,240			49,943
Austria	8,466			65,938		373
Ireland (Eire)	5,112					
Belgium	19,841					
Bulgaria						1,241
Denmark				171,811	13,904	
Netherlands	309,376	10,595	16,784			2,802
Hungary						5,593
Norway		2,216				
Singapore		52,487				
Aden		2,222				
Poland						5,077

Continued --

Table 31.-Israel: Exports of citrus products, 1947-48, 1948-49 and 1949-50, continued

Year and Country of Destination	Citrus Products					
	Concentrated Citrus Juices	Pasteurized Juices	Fruit Cells	Pulps	Peels in Brine	Essential Oils
	Pounds	Pounds	Pounds	Pounds	Pounds	Pounds
1948-49, cont.						
Finland	3,322		3,388	4,354	-	205
Czechoslovakia	659,061		405,038		308,968	22,011
France	27,926					2,198
U.S.S.R.						99,273
Sweden	181,079					7,288
Switzerland	24,374					
Total	7,937,272	67,520	881,450	242,103	322,872	196,004
1949-50						
United Kingdom	4,186,776		466,269			78,021
Indonesia		4,784				
Australia						3,362
Belgium		613				
France						2,313
Czechoslovakia	64,723				131,780	5,179
Denmark	53	112,655	2,324		69,648	595
Aden		617				
Finland	1,102			485	1,307	306
Netherlands	96,442	5,452	32,588	-	-	1,296
West Indies		1,248				
Rumania					4,467	
Singapore	51,168					
Switzerland	34,553		421			437
Sweden	164,847					
U.S.S.R.						29,663
Poland						27,650
Total	4,599,664	125,369	501,602	485	207,202	148,822

1/ During 1947-48 Israel exported 31,746 pounds of grapefruit segments to Eire. No records of export of this commodity during 1948-49 and 1949-50.

Source: Obtained by the office of the Commercial Attache, Tel Aviv, from the Citrus Concentrates Bottlers' Association.

Current Situation

The processing industry has certain economic restrictions which guide its policy, such as the requirement that a certain percentage of processing labor be employed for the entire year. Only such workers as are specified as strictly seasonal may be laid off at the conclusion of the operating season. Due to this fact, and the shortage of supplies of fresh fruit, the recent change in the processing industry has been the development of non-citrus products with most of the plants processing tomato products and many of them going into an extended line of foods, including fish and meat. The majority of such canned foods, particularly the vegetables, are marketed in Israel.

The Citrus Concentrates Bottlers' Association is operating an experimental laboratory at Rehovot. According to Dr. Braverman, the primary research projects now under way are first, the investigation of processes whereby pectin may be produced without the utilization of alcohol washes. Due to the shortage of alcohol in Israel, it is commercially expedient to eliminate the use of alcohol, if possible, for the operation of a pectin industry.

Another research project is continuing experimentation in the development of protein cattle feeds from peel.

Thirdly, a general project is under way for the improvement of existing products, such as 65 Brix concentrate and single-strength juices. In this connection, some small experimentation has been done on the production of frozen orange juice concentrate for the domestic market. Dr. Braverman believes that a satisfactory frozen orange juice concentrate can be produced by much simpler processes than are employed in the United States. It is his opinion that existing concentrate pans which are utilized for the production of 65 Brix concentrate have a sufficient vacuum and low enough temperature to make a satisfactory quality product, since the flavor qualities are added to the concentrate by the cut-back of natural juices. If this plan were successful, frozen orange juice concentrate could be produced with existing equipment in Israel with only the addition of a simple freezing process.

In this industry, there is a conflict between the processing industry and growers, the growers claiming that fruit can not be raised for processing, and the processors claiming that the price paid for fruit is too high to assure a reasonable profit. A problem of this industry is the very short processing season, in which fruit is available in volume for only 3 months, and the total season does not exceed 5 months. If the Mediterranean fruit fly could be controlled, the quality of juice products could be improved and it would be possible to extend the season in the summer. However, such control is unlikely.

Another problem of the industry is the lack of a good early processing orange. In this regard, the possibility of raising Hamlins, or Washington navels 16/, and other early non-blood types is being investigated.

In order to insure adequate volumes of fruit for processing, processors indicate that they would be willing to go into the business of growing citrus. However, under existing Government regulations, this is impossible since the Citrus Control Board designates what citrus may be planted and, through the Marketing Control Board, controls the disposition of the crop.

The primary variety of orange processed is Shamouti, with a few Valencias being used late in the season. Many of the Shamoutis used are extremely large -- larger than the 150- to 90-pound case. This makes for unusual problems in mechanical juice extraction.

A Visit to Assis, Priman, and Jaf-Ora

The largest processing plants were visited. Jaf-Ora, located at Rehovot, operates in an old winery. The equipment in the plant is primarily of American manufacture with good machinery juice extractors being used. The concentrating equipment is of English manufacture. In this winery, glass-lined tanks, formerly used for wine, are found highly suitable to the storage of sulfur dioxide-treated concentrate to be used in the bottling of squash after the main processing season is ended.

The plant is highly mechanized, with an automatic dumping device for trucks and fruit storage bins from which the fruit is carried by water. The primary products of the plant are 65 Brix concentrate for export and domestic trade, as well as single-strength juice, alcohol, dried peel for cattle feed, and essential oils.

Priman is located at Tel Aviv, and this plant has greatly expanded its non-citrus processing capacity in recent years. Like other Israel plants, it has a highly mechanized citrus processing procedure with automatic dumping, conveyors, etc. An interesting feature of this plant is that the essential-oil and juice extractors are of local manufacture. The fruit coming from the bins is washed, and then it passes through an essential-oil extractor consisting of revolving rollers covered with perforated metal similar to a grater. The fruit bounces against these sharp edges, expressing the essential oil. After leaving this oil extractor, the fruit is washed and then passes to the sizer and automatic juice extractors. It is the opinion of the operators of this plant that the quality of the juice is much improved by the reduction of the quantity of essential oil before the fruit passes into the extractors. Single-strength juice, which was one year old and stored under non-refrigerated conditions, was still of excellent quality.

16/ The Washington navel is not considered to have processing qualities in the United States.

Table 32.-Palestine: Analysis of single-strength canned orange juice, 1949

Analysis category	Unit	Sample 1	Sample 2
Fluid measure	Fluid ounces	20.1	18.8
Vacuum	Inches	13	18
Density	Degrees Brix	12.0°	11.4°
Anhydrous citric acid	Grams per 100 milligrams	.95	1.02
Recoverable oil	Percent by volume	.0075%	Trace
Pulp	Percent	14%	12%
Ascorbic acid	Milligrams per 100 milliliters	37.0	37.2
Color		Typical, but not bright	Typical, but not very bright
Defects		Insect eggs and maggots present	Free from defects
Ratio of Brix to citric acid		12.6 to 1	11.1 to 1
Flavor		Fine, distinct, normal	Fine, distinct, normal canned orange juice flavor
Grade		A or Fancy if free from insect contamination	U.S. Grade A or U.S. Fancy

Source: Tested by Standardization and Inspection Division, Fruit and Vegetable Branch, Production and Marketing Administration of the United States Department of Agriculture.

Assis is also located in Tel Aviv and is the largest processing plant in the Middle East, having a capacity of 441 short tons of fruit per day. As in other plants, it also produces an extended line of non-citrus products. Both Jaf-Ora and Assis are planning to produce orange slices in syrup for export this season. This is a rather new product, which will be manufactured in greater volume than in the past. Assis has automatic truck unloaders, bins emptied by water, fruit conveyors, American-manufactured juice extractors, and a concentrator. It also has the largest capacity, outside of the United States, for the production of dried peels for cattle feed. In addition, it produces alcohol and molasses.

In one large department, Assis has excellent facilities for the production of grapefruit sections. The layout of this plant is similar to those in Florida, and from the size of this department, it must have the largest capacity of any plant outside the United States for this product.

Generally, the Israel processing plants observed were modern, labor saving operations capable of producing excellent quality products. In the plants visited, no new or radical changes in processing were seen, and none could be expected in view of the probable continued restriction in quantity of fruit available in the next few years. The essential oil extractor utilized by Priman is very interesting and may be helpful in the production of high quality essential oils and juice.

Some Economic and Political Factors

The future of this industry will be governed to a large extent by the political factors, in addition to the basic over-all economic situation. In the 1949-50 season, processors paid 7½ Israel pounds ($19.00) per ton for fruit to be used in the production of export citrus products. A price of 12 Israel pounds ($30.00) per ton was paid for fruit to be used in processing for domestic consumption. Under this plan, the payment was divided at the end of the season and paid to the Marketing Board in accordance with the volume of each type of product produced. Under the present plan it is mandatory to process for export, and the plants are prorated the amount which each shall produce, and they earn the right to produce for domestic sale by the production of export products. Products for domestic sale are more profitable in spite of the higher prices paid for the fruit used. Processors state that the Marketing Board is asking a higher price for processing fruit in the 1950-51 season, and the opening quotation was 12 Israel pounds ($30.00) per ton for fruit to be used in the production of export benefits. If this basic price is used, it is probable that the price of fruit for the production of domestic products will be approximately 18 Israel pounds ($46.00) per ton.

The volume of processed products from Israel will be restricted for the next 10 years unless unusual difficulties are encountered in the marketing of fresh fruit. While there are no radical changes now taking place in the industry, it should be kept in mind that the technical people available in Israel, and their apparent ability for developing an industrialized citrus industry, should make it possible for new and advanced processed citrus products to be developed in the future.

XI. THE POLITICAL SITUATION AND THE CITRUS INDUSTRY

The citrus industry of Palestine was built upon the availability of Arab labor. In the past, the Jewish immigrant had to compete with Arab labor, and for this reason usually was not employed in the citrus industry, but in other occupations or in cooperative ventures of various types. The citrus grower claimed he could not afford to pay higher wages, and he therefore utilized the Arab labor. The situation is now changed, due to the emigration of the former Arab employees. The policy of the present labor-dominated Government toward the citrus industry must be considered in the light of this history, since the employment of Arab labor by citrus growers was never held in favor by the Jewish labor organizations or the cooperatives.

The organization of cooperatives in Israel is an interesting part of the economic and political picture. Generally, cooperatives are of two types. The first type is very similar to United States cooperatives in which both land and family are maintained as individual units, each member sharing in the proceeds of the sale of the fruit in accordance with the amount which he produces in his grove. Quite different from this is the Kibbutz, which is also a cooperative but of a pure communal type. Organizations of this type have been in operation for 40 years in Israel, and under this plan the individual members own no property but share in the general earnings of the group. A member of a Kibbutz draws no wages but receives an issue of clothes and other necessities as these are available from the group earnings. When Kibbutzes were first started, it was not uncommon that a Kibbutz own only one going-to-town suit of clothes which was worn by any member who found it necessary to travel outside the farm. The Kibbutzes are primarily agricultural, and many of them raise citrus. The social life is unusual in that the family is not maintained as a unit, and both the husband and wife work. All members eat in a common dining hall, and the children do not live with their parents. It is common for work to be stopped at 4 o'clock in the afternoon, and children are with their parents from that time until the dinner hour, and again after dinner until bedtime. Separate nurseries and schools are maintained for the children. A member of a Kibbutz receives cash only once a year when funds are made available for an annual vacation. Some of these organizations are quite wealthy and have excellent agricultural and industrial facilities. They are politically important since their membership is partially made up of those who could not obtain employment in competition with Arab labor, and, while their life is purely communal, they are strongly Zionist, and therefore anti-Communist.

The Current Situation

The many changes taking place in Israel are evident in each phase of the citrus industry. These changes are all a part of the establishment of the State of Israel, and these problems act together to create the "current situation" in the citrus industry which must be understood in order for its future to be evaluated.

This is a rapidly changing situation in which agriculture and industry, private enterprise and Government, each attempt to find its place in the new society. The determination of the people to carry on their new state is a powerful influence which the visitor senses. While there is a vital determination, one feels that all plans are formative and that each new problem will be met as it occurs. The solution of immediate problems on a day-to-day basis absorbs the attention of most leaders in Government and industry.

The current situation developed out of the problems which the citrus industry faced in World War II when it was almost impossible to export fresh fruit. This created a period during which it was unprofitable to grow citrus. The supplies of surplus fruit stimulated the processing industry, but many groves were abandoned or poorly cared for.

These difficulties occurred while Palestine was a mandated territory of England. After the end of the mandate, the crisis arose which developed into the war between Jewish Palestine and Arab Palestine, assisted by the neighboring Arab countries. The State of Israel arose out of this conflict. This conflict and the changes resulting from the establishment of the new State of Israel can be described as periods of emigration of the Arab population of Israel, the immigration of the new Jewish settlers, and the rehabilitation of the country under the new situation.

Emigration

During the conflict, several hundred thousand Arabs left the section of Palestine which is now Israel, becoming refugees in Lebanon, Jordan, and Egypt, where they now live in camps under the most impoverished conditions. Most of these refugees were land owning farmers, and a smaller number were laborers, many of whom were employed in the citrus industry, cultivating the closely planted groves by hand and doing most of the harvesting, grading, and packing of fruit. All of these operations require skill and knowledge acquired over a long period of time. The emigration of these people meant that Israel lost most of its skilled workers in the citrus industry, and the loss of these workers has created the most serious problems in the citrus industry today.

Figure 34.--A dead orange grove representative of thousands of acres of abandoned properties in Israel.

Figure 35.--Dead orange trees piled for burning as the land is cleared for other irrigated crops.

Figure 36.--Abandoned Arab home and grove.

Figure 37.--On the left is an abandoned grove, and on the right is a grove in which irrigation has been continued.

Figure 38.--A destroyed Arab village. Such dwellings were the homes of Arabs employed in the citrus industry.

Figure 39.--A road block between Israel and Transjordan.

Figure 40.--Abandoned home of an Arab citrus grower.

Figure 41.--Unloading baggage of immigrants arriving in Israel.

Figure 42.--A tent camp for immigrants. In 1950, about 100,000 immigrants were living in such housing.

Figure 43.--A new settlement, typical of developments taking place in all parts of Israel. Some of this housing is prefabricated units purchased from Sweden by the export of citrus.

Figure 44.--A grove being rehabilitated after being without irrigation for 2 years. It has been pruned and is being sprinkler irrigated.

Figure 45.--An old grove equipped with overhead sprinklers. The pipe is a part of that purchased with the import-export bank loan.

Figure 46.--A mature grove in which every second row of trees has been removed to permit mechanical cultivation. This type of grove thinning is rather unusual in Israel today.

Figure 47.--The type of land which is to be brought under irrigation and planted to citrus.

About half of Palestine's citrus industry before the war was owned by Arabs. When these Arab grove owners emigrated, their groves were left uncared for, and the trees died from the lack of irrigation.

Some Jewish-owned groves also were abandoned because there was no Arab labor to carry on the cultivation. These abandoned Jewish groves were usually those of middle size: too large to be cultivated by the owner, and too small to have the benefits of management available to the very large grove.

Two groups of groves survived the conflict: the small grove, which could be kept reasonably well cultivated by the owner and his family, and the very large grove which used mechanical tillage and which had trained administrative personnel able to carry on without the former Arab workers.

The signs of emigration are evident all over Israel in the dead orange groves, and abandoned homes of the Arab grove owners. The contrast is dramatic when a Jewish grove is next to a deserted Arab grove. The Jewish grove, cared for and irrigated, is lush and green and bears a good crop of fruit, while the neighboring Arab grove, which once was as flourishing, is a parched land of dead trees.

Many of the Arab villages were destroyed in the war and many village homes that were left standing have since been dynamited as unsafe housing.

The road blocks of barbed wire and concrete tank traps mark the border between Jordan and Israel.

Immigration

For years there has been an immigration of Jewish peoples to Palestine. Near the end of the British Mandate, this was accelerated and Jewish peoples from all over the world came to Israel. This flow of immigrants has continued under the State of Israel, which is subsidizing a part of the expense of this immigration. The immigrants came from all over the world: the United States, Europe, Asia, the Atlas Mountains of Morocco, and from Yemen in Arabia. They are a mixture of peoples of all types and cultures. In 1950, it was reported that 20,000 of these people were immigrating each month, and the immigrant ships and tent camps were evidence of this flow of people.

Upon arriving in Israel, many immigrants are housed in temporary tent camps, operated by the Government. There, through health and educational programs, the process of indoctrination begins. For many of these people, the new life in Israel, as planned, is on a much higher cultural plane than that to which they are accustomed, and much higher than that country has ever supported in the past.

Most of these people are used to a very simple way of life, and they are unskilled in the types of work which the citrus industry has to offer.

The tent camp serves as housing until the immigrant can be "placed." In 1950 it was estimated that more than 100,000 people were then living in such temporary housing and the flow of the new immigrants was continuing unabated.

Placing the immigrant requires that he learn a gainful occupation and that other housing is available near his work. In urban centers, many new apartment houses are being constructed and here the industrial workers will live. In the rural areas, the Kibbutzes are also building to accommodate new members and some of these settlements are giving temporary employment to immigrants as a part of the training program.

Most of the settlement in rural areas is taking place in new communities which are being built by the Government with prefabricated houses on land recently brought under irrigation. Many such settlements were observed all over Israel and each home has enough land for fruit trees and a garden.

This rush of immigrants is the pulse of Israel today and every problem of the citrus industry is related in some way to the problem of making these people a productive part of the new society.

After the Jewish-Arab war there were about 600,000 persons in Israel. In the last 3 years, an estimated 400,000 immigrants have been added to the population, which indicates the magnitude of the task of resettlement and rehabilitation.

Rehabilitation

At the end of the war, the citrus industry was nearly at a standstill with groves largely uncared for and much of the skilled labor gone. The great task of rehabilitation was to be undertaken.

The abandoned groves were placed in the charge of a Government custodian of the abandoned property. Most of this property was in such a poor condition that it was useless to attempt to care for it. However, some of the orange groves which were favorably situated were in fair condition even though they had not been irrigated for 2 years. These groves are being operated by the custodian as a part of the rehabilitation program, but some growers believe that more money is being expended in rehabilitation than the groves are worth.

Some groves in which the trees are dead are being cleared and leased on a 5-year basis for non-citrus irrigated crops.

Changing cultural practices in all groves were necessitated by the shortage of labor, its increased cost, and its inefficiency. This resulted in the use of non-tillage culture, sprinkler irrigation, and improved packing facilities.

In groves where it was undesirable to practice non-tillage, every other row of trees was removed to permit mechanical cultivation. This was done primarily on communal groves of the Kibbutz, and in very large, privately owned groves. This is not a general practice.

Also, new, extensive plantings of citrus were planned on lands leased from the Government.

Thus, Israel's citrus industry is being rehabilitated with new cultural practices, and plans for the extension of irrigated agriculture. The new immigrants are becoming an important part of this program as they learn skills required by their life in this new society.

This pattern of change is the current situation in Israel out of which will come the new and different citrus industry.

XII. CONCLUSION

Because of the climate under which it is grown, the average Israeli orange is considerably larger than its Mediterranean competitors. Most European fruit dealers prefer a smaller orange than the average-sized Shamouti. Therefore, Israel sometimes will be penalized in the market on the basis of fruit size.

During the Jewish-Arab war the abandonment of groves so reduced the productive acreage that there are only about 33,600 acres of producing citrus today in Israel. This will result in production and exports in the next 10 years much below prewar.

New plantings are planned but even if these are carried out there will only be about 55,600 acres of commercial citrus in Israel by 1958. These plans for extension of the citrus industry may not be realized because of the increasing urbanization and industrialization of the country. Another important limiting factor is water resources. Great efforts are being made to develop new supplies of water for irrigation, but Israel does not have a large watershed to draw on. While some increase in water development is possible, the fact that the water level in valley wells has dropped several feet in the last 10 years, may indicate that the limit is being reached. When water is in short supply, urban and industrial users usually have a higher priority than does agriculture.

The great change in Israel's economy places the citrus industry on an entirely new basis, and there can be little comparison between the old citrus industry of Palestine and what will be the new citrus industry of Israel. From cost studies verified by observations in the field, it is apparent that Israel's citrus industry is unlikely to be operated at costs which are competitive with other Mediterranean citrus areas. The industry will be subject to Government control, which probably will favor the large operator to the disadvantage of the smaller grower who will find himself less able to compete under the new conditions.

While subsidies have been given the citrus industry in recent years, they are inadequate in view of changing economic conditions. It would seem that in the next 5 years, if citrus is to be profitable to the Israel grower, Government subsidies as high as 50 percent of f.o.b. value may have to be paid.

Due to labor costs and shortages of tin plate and fruit, the processing industry also will be in an unfavorable position and will partly offset this by using considerable plant capacity for non-citrus products.

The presence of the Mediterranean fruit fly makes the production of high quality orange juice products impossible, since the larva is always present in large-scale processing. Tests of Israel citrus juices indicate the presence of the fruit fly larva, which reduces the grade.

The citrus industry is well staffed with competent people, and in spite of the unfavorable economic situation, the industry probably will continue to exist because of its importance to the economy of the country as a foreign exchange earning enterprise.

One cannot visit Israel without feeling the great will of the people to succeed over tremendous obstacles; and certainly some of this will apply to the development of the new citrus industry. However, it would seem unlikely that the citrus industry of Israel will ever again obtain the production of prewar years or that total production will exceed 10 million boxes in any year to 1960.